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ADDISONIA

COLORED ILLUSTRATIONS

AND

POPULAR DESCRIPTIONS

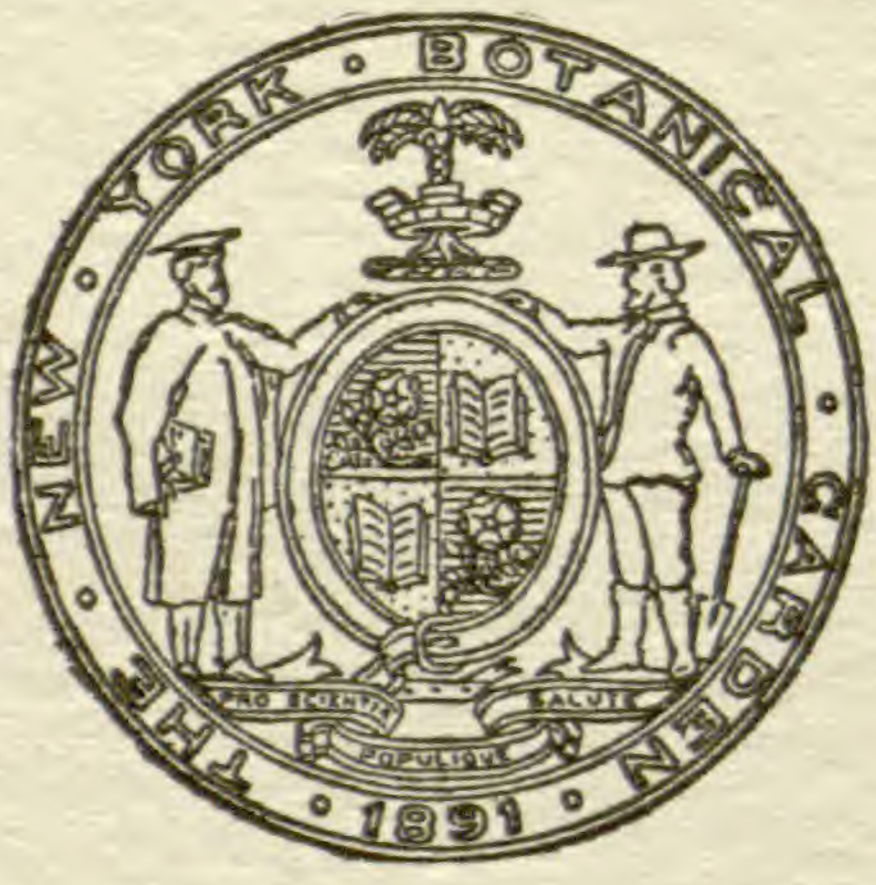
OF

PLANTS

VOLUME 20

1937—1938

Taxonomic and alphabetic
Index 16-20



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CENTRADENIA GRANDIFOLIA

(Plate 641)

CENTRADENIA GRANDIFOLIA

Native of Mexico and Central America

Family MELASTOMATACEAE — MEADOW BEAUTY Family

Rhexia grandifolia Schlecht. Linnaea **13**: 429. 1839.
Centradenia grandifolia Endl.; Naud. Ann. Sci. Nat. Bot. III. **12**: 272. 1849.

In a plant-family noted for the beauty of its flowers, it is strange that so few species have been introduced into cultivation. A few species of *Tibouchina* and a magnificent *Medinilla* are occasionally seen in conservatories, but the charming flowers of *Monochaetum, Meriania, Blakea,* and many other genera are mostly unknown to flower-fanciers of the temperate zone.

The genus *Centradenia,* for example, is represented in Mexico and Central America by seven species, all about equally attractive and all probably equally adapted to greenhouse conditions. Only three of these have been cultivated, and of these the one illustrated in our plate is the best known. It was first introduced about eighty years ago and apparently attracted much favorable attention for a decade, but at present is seldom seen except in botanical gardens and the larger conservatories. Those who have seen the beautiful plants on display at The New York Botanical Garden during the winter months will agree that it deserves a far wider popularity.

When well grown, it reaches its best condition and blooms at a height of one to two feet. The leaves, then a rich green on the upper surface, tend to droop, exposing the deep red of the lower side, while both colors contrast pleasantly with the ample clusters of pink flowers. The stems never grow directly upright, but are always somewhat inclined; they are square and sharply four-winged, and usually so disposed that one wing is on the upper side of the stem, one on the lower, and the other two at the middle of the sides. The opposite leaves appear from the flat sides of the stems between the wings, and these sides face either diagonally upward or diagonally downward. In every case, the leaves arising from the upper side of the stem are quite small, while those from the lower side are large and form most of the foliage of the plant. This habit of producing leaves of two types is known as anisophylly and is displayed by many members of the Meadow Beauty Family. Anisophylly is usually associated with an inclined or oblique position of the stem, and the habit of growing in this position is known as plagiotropism.

This species of *Centradenia* is easily propagated from cuttings, which are best taken in April. The plants enjoy plenty of heat and a loose soil rich in humus, but require shade during the summer months. Under good cultural conditions, they begin to bloom the following winter and reach their best condition during the second winter. After this they should be discarded, as they tend to lose their lower leaves and become ungainly.

Centradenia grandifolia is an herb, in nature becoming five feet high, with smooth, square, four-winged stems branching with age. The leaves are of two types: the smaller, along the upper side of the stem, are sessile, narrow, and usually less than an inch long; the larger, from the lower sides of the stem, are oblong, four to seven inches long and one to two inches wide, strongly falcate, on short stalks, rounded at the base on one side and tapering on the other, slightly hairy above, and with four principal veins. The inflorescence is terminal and freely branched, mingled with small narrow bracts which soon drop off. The flowers are about two thirds of an inch wide, with four pink petals and eight projecting stamens. The stamens, as shown by close examination, are of two forms, the larger ones bearing at the base a conspicuous appendage. The fruit is a dry capsule with many seeds.

H. A. GLEASON.

EXPLANATION OF PLATE. Fig. 1.—Leaves and flowers. Fig. 2.—Calyx and style, ×3. Fig. 3.—Petal ×2. Fig. 4.—Stamen of smaller series ×4. Fig. 5.—Stamen of the larger series ×4. Fig. 6.—Ripe capsule.

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Mary E Eaton

HERBERTIA DRUMMONDII

(Plate 642)

HERBERTIA DRUMMONDII

Celestials

Native of Louisiana and Texas

Family IRIDACEAE — IRIS Family

Cypella Drummondii R. Graham, Edinb. N. Phil. Jour. xx. 190. 1836.
Alophia Drummondiana Herb. Bot. Mag. under *pl. 3779.* 1840.
Trifurcia caerulea Herb. Bot. Mag. under *pl. 3779.* 1840.
Herbertia caerulea Herb. Bot. Mag. *pl. 3862.* fig. 3. d.e.f. 1841.
Herbertia Drummondiana Herb. Bot. Reg. misc. 65. 1842.
Iris brachystigma Scheele, Linnaea, xxii. 348. 1849.
Herbertia Watsoni Baker Handb. Irid. 71. 1892.
Herbertia Drummondii Small, comb. nov.

It is notable that the Iris family reaches its greatest diversity of flower form and genera in tropical and subtropical regions. Our only two states which approach reasonably near the Tropic of Cancer—Texas and Florida—give evidence on this point. Each has a species of *Nemastylis*, and each an endemic genus, *Salpingostylis* in Florida, and *Eustylis* in the Texas region. In addition, the latter region has a northern outlier of the tropical genus *Herbertia,* which species is our present subject. The lower end of California, ordinarily thought of as quite southern, is really in the same latitude as Charleston, South Carolina. The bulbous flora of California, however, is quite its own and with little if any relation to Texas and Florida. The present subject, which inhabits prairies and marshes in the Coastal Plain of Louisiana and Texas, was discovered before 1841. Though small of stature this plant is remarkable for its vigor. Metaphorically speaking, this endowment has served it well in supporting its extraordinary number of synonyms. This multiplication of names is the result, for the most part, of attempting to study and describe evanescent flowers of this kind from dried specimens, a procedure, fortunately, no longer necessary.

This *Herbertia* has an interesting life history. The freely produced seeds, having fallen to the ground, lie there until rains wash them into the pasty gumbo, the peculiar black soil of the Mississippi delta. In due season they sprout and soon develop into small bulbs. In the dry season the bulbs remain stationary, firmly encased in the dry, hard, sun-baked gumbo near the surface. With each succeeding wet spell, the bulbs dig deeper and deeper into the soil, at the same time increasing in size. After they have reached a depth of four to eight inches they have stowed away enough energy to produce a strong flowering stem, as shown in the illustration. As sev-

eral years may elapse between the falling of the seed and the production of a flower, bulbs ranging from little larger than a pin-head to the size illustrated here may be found under the turf where the plants grow. As a result of its curious bulb development a single spadefull of soil may disclose several hundred bulbs of all sizes. The cycle of propagation is naturally exceedingly slow, much slower than that of its relative, described on a succeeding page.

These particular studies were made by Edward J. Alexander and the writer in a swamp along a bayou near Chalmette, Louisiana, at the site of the celebrated battle of New Orleans. This locality seems to be the first one known east of the Mississippi River. In April the flowering plants form almost solid patches of blue-violet.

The perianth of the flower is developed similar to that of *Iris tripetala* and *Iris Hookeri,* namely large sepals and very small petals (see illustration). The specialized top of the capsule ultimately opens by three valves which stand erect and allow the seeds to be spilled about the base of the plant by the wind or some other shock.

Herbertia is a scapose herb with a deep-seated brown-coated bulb. The bulb is ovoid or subglobose, when mature three fourths inch long and an inch in diameter. The leaves, with sheathing bases and plicate, narrow, linear blades, are up to a foot tall. The scape is erect, more or less sheathed by the leaf-bases, slender, usually simple, up to a foot tall. The rather long-stalked flowers are erect, one or two arising from a spathe. The hypanthium-tube is very short or wanting. The perianth is about two inches wide. The three sepals are crestless, cuneate-obovate or cuneate, spreading, broadly acute, pale or dark lavender, with a violet halo outlining the white base, which is violet spotted, or the whole sepals may be white in albino forms. The three petals are very much smaller than the sepals, short-acuminate, the upper part violet, the lower more or less channeled, black-violet, and sometimes with white spots near the base. The anthers are narrow, lying against the style-branches, curling inward at anthesis. The style-branches are spreading or ascending, each tipped with two subulate stigmas which are toothed at the apex. The capsule is erect, thin-walled, cylindric or somewhat clavate, an inch long or less, stramineous in age.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Plant in flower. Fig. 2.—Bulb. Fig. 3.—Sepal and petal. Fig. 4.—Essential organs: ovary surrounded by the hypanthium, cylindric style and style-branches with appressed anthers which curl over between the forked stigmas × 2. Fig. 5.—Two ripening capsules subtended by spathes. Fig. 6.—Mature capsule.

HELIANTHUS MOLLIS

(Plate 643)

HELIANTHUS MOLLIS

Ashen Sunflower

Native of eastern and central United States

Family CARDUACEAE THISTLE Family

Helianthus mollis Lam. Encycl. 3 : 85. 1789.

Composites are among America's choicest horticultural gifts to the rest of the world. One has only to consider the value to gardens of zinnias, cosmos, marigolds, dahlias, coreopsis, ageratum, heleniums, asters, and sunflowers, for example, to realize the importance of this group. Among the first of these to find their way into gardens of Europe were the sunflowers, which were first grown in the royal gardens of Spain and France. It was from specimens thus cultivated that botanists obtained their early knowledge of these plants and first described them. Among them was our present subject, which was originally pictured in 1775, without description. It is still grown as a background plant where the bold effect of its coarse, ashen foliage is desired. In habit it is strikingly different from other sunflowers in the color and form of its leaves, its resemblance being more that of a *Silphium,* for which it is often mistaken when first seen. The broadly ovate leaves, which are upwardly spreading at first, begin to curl together by flowering time, so that some of their coarseness is lost. The plant is quite attractive then with its bright yellow heads.

This sunflower occurs wild in dry soil from Massachusetts south to Georgia and west to Texas, Kansas and Iowa. The painting was made from plants at the Botanical Garden raised from seed collected in northeastern Alabama.

The ashen sunflower is an herbaceous perennial up to five feet tall, arising from a stout rootstock, the stems little-branched, covered with a dense grayish pubescence. The leaves are opposite, sessile, up to about seven inches long, broadly ovate with a semi-cordate base, the apex acute, the margins suppressed crenate-serrate, densely covered with gray pubescence, the entire plant appearing light gray-green. The inflorescence is racemoid, the terminal head flowering first, the lower one or two heads frequently short-peduncled, the remainder sessile or nearly so. The involucre is hemispherical, the bracts ovate-acuminate, densely gray-pubescent, spreading, about three fourths of an inch in diameter. The rays are bright yellow, an inch to an inch and a half long, numerous. The disk flowers are

yellow, the anthers brown, the chaff about as long as the corollas, gray-green. The achene is gray, usually with black or brown barrings, the two pappus awns caducous after maturity.

EDWARD J. ALEXANDER.

EXPLANATION OF PLATE. Fig. 1.—Upper portion of inflorescence. Fig. 2.—Stem with leaves. Fig. 3.—Ray floret. Fig. 4.—Disk floret in anthesis × 2½. Fig. 5.—Disk floret with stigmas protruding after anthesis. Fig. 6.—Ripe achene.

ALLIUM STELLATUM

(Plate 644)

ALLIUM STELLATUM

Prairie Onion

Native of west central North America

Family ALLIACEAE — ONION Family

Allium stellatum Ker. Gawl. Bot. Mag. *pl. 1576.* 1813.

The onion is a remarkable plant. It develops great extremes for the human olfactory tract—the well-known alliaceous odor of the bulbs and foliage and the violet-like fragrance of the flowers of some of the species. The genus is very widely distributed in the Northern Hemisphere. Of the approximately three hundred species about seventy-five are native in North America.

Our present subject, when first described and figured, was said to have been first found growing on the banks of the Missouri River by Thomas Nuttall. Discovered in a period and a region in which outstanding botanical history was being made in America, this flowering onion aroused interest in Europe. In England when the plant was first studied it was associated with the eastern American *Allium cernuum,* to which, however, it is only remotely related. It was not long before its geographic range was widened, mainly through the extensive explorations carried on west of the Mississippi. Now it is known to range from Illinois to Arkansas and Kansas, and northward to Saskatchewan and Manitoba, occurring in varied habitats and chemical types of soil. The natural habitats on record are rocky ground, limestone glades and barrens, rocky hillsides, bald knobs, rocky bluffs, high hills, and cliffs, and since civilization has invaded its native territory, waste places should be added. The bulbs from which the accompanying illustration was made were collected on ledges of the Ozark Plateau at Eureka Springs, Arkansas, by Edgar T. Wherry and the writer in May, 1925, and flowered at The New York Botanical Garden in September of the same year. On the southward facing cliffs of the Ozarks, this plant is truly an ornamental, for on shelf above shelf the cliffs are lined with plants hanging over the ledges in long lines of color.

In a garden border, none of the flowering onions is more showy in the first week in September than this native of the Great Plains. Its inclined or sometimes nodding umbels of pinkish-lavender (occasionally white) flowers often remain fresh for a month. Although

it sometimes fails to produce seeds in exotic localities, its bulbs multiply slowly, thus enabling the plants to hold their own satisfactorily without becoming weedy. The umbels are usually many-flowered and are not marred by the production of bulbils as are those of some of its related species.

The prairie onion is a scapose herb, with the leaves and scape arising from an ovoid bulb about an inch long and two-thirds inch in diameter, membranous-coated, the scales prolonged as scarious sheaths about the base of the scape. The sheaths terminate in narrowly linear leaf-blades four to eight inches long, bright-green, nearly flat, or slightly concave above, acute. The scape, ten to twenty inches tall, is obscurely angled, more or less two-edged, glaucescent above. The umbel is erect, usually many-flowered, subtended by a spathe of usually two ovate, scarious, acute bracts. The pedicels are slender, about an inch long, straight or nearly so, spreading in all directions, green, sometimes thickened and yellowish under the perianth. The perianth opens nearly white or pinkish-lavender, the color deepening with age. The sepals are narrowly ovate and spreading. The petals are elliptic-ovate, a little longer than the sepals, ascending, more or less involute near the base. The stamens are strongly ascending and long-exserted. The filaments are subulate-filiform, lavender, alternately shorter (opposite the sepals) and longer (opposite the petals). The anthers are yellow, those opposite the petals usually smaller than those opposite the sepals. The ovary is sessile, broadly turbinate, each carpel with an ascending two-lobed, pink-tinged crest. The lavender style is subulate. The capsule is campanulate, the two-lobed crest erect, with the valves ultimately spreading, exposing and discharging the black seeds.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Top of flowering scape. Fig. 2.—Bulb with series of leaves whose elongate membranous bases surround the base of the scape. Fig. 3.—Sepals and petals, the former flat, the latter involute at the base, and two dimorphic stamens ×3. Fig. 4.—Gynoecium, ovary, columnar style, and minute stigma ×3. Fig. 5.—Mature and dehiscing capsule ×2. Fig. 6.—Seed ×4.

CRYPTANTHUS GLAZIOVII

(Plate 645)

CRYPTANTHUS GLAZIOVII

Glaziou's Cryptanthus

Native of eastern Brazil

Family BROMELIACEAE — PINEAPPLE Family

Cryptanthus Glaziovii Mez in Mart. Fl. Bras. 3^3: 202. 1891.

The history of *Cryptanthus* is the history of the whole *Bromeliaceae* in miniature. Time and again we find a genus of this family whose species have been described largely from horticultural specimens, while the species of a closely related but rather less spctacular genus have been described from herbarium specimens direct from the wild. In the small genus *Cryptanthus* we have two subgenera: *Hoplocryptanthus* with the leaf-blades narrowly triangular and sessile upon the sheath, and *Eucryptanthus* with the leaves constricted or petiolate above the sheath.

Until now, *Hoplocryptanthus* with its two species, *C. Glaziovii* and *C. Schwackeanus,* has played the rôle of ugly duckling, with all of its records based on herbarium specimens. Even in breaking this sequence, it is significant that there is an exact herbarium counterpart to the living material, Rose & Russell No. 20,033, collected near Monte Cruzeiro in the state of Bahia, Brazil, in June, 1915. This is a very unusual case as we can see by comparison with the species of *Eucryptanthus.*

In *Eucryptanthus* all ten species have been described from horticultural material with only the haziest idea as to where they were originally collected. "Brazil," often followed by a question-mark, is the best that most of the original descriptions can do. What is more, nearly all of them still remain in the same nebulous state today, never having been rediscovered in the wild. Even one of the original species, *C. bromelioides,* described in 1836, can be located no more definitely than "Brazil."

From the species whose origins we do know, we can estimate the range of the genus as eastern Brazil from Pernambuco south to Rio de Janeiro and central Minas Geraes. This is the exact center of the *Bromelioideae,* the subfamily characterized by an inferior ovary and an indehiscent more or less berry-like fruit and containing both *Cryptanthus* and *Ananas,* the familiar pineapple.

The lines between the genera in this subfamily are often difficult to follow and in some cases may have to be replaced or discarded, but fortunately *Cryptanthus* is rather easily distinguished. It is characterized by an inflorescence of very few flowers sunk in the center of the rosette or of the terminal leaves and by a slenderly tubular unappendaged white corolla with wide-spreading lobes. More technical characters like the form of the pollen-grains are resorted to in monographic works but the above characters serve perfectly well to distinguish this genus from any of its cultivated relatives.

The plant figured here has been cultivated since 1915 in a greenhouse of The New York Botanical Garden under identical conditions with most of the other bromeliads kept there, namely a very moist warm atmosphere. The soil is of slight if any importance as the members of the *Bromelioideae* subfamily are at least functional epiphytes and can grow as well suspended by a wire as in a pot.

Cryptanthus Glaziovii is a perennial herb with a long stout leafy branching stem which distinguishes it from nearly all the other members of the genus. The leaf-sheaths are closely imbricate and make the stem appear much stouter than it really is. The leaf-blades are stiffly spreading or recurved, widely spaced, sessile upon the sheaths, narrowly triangular, acuminate, up to ten inches long, laxly spinose-serrate, thick, green and glabrous above and very finely and evenly striate and white-lepidote beneath. The sepals are broadly acute and are connate for much of their length. The corolla is about an inch long with elliptic obtuse lobes.

LYMAN B. SMITH.

EXPLANATION OF PLATE. Fig. 1.—Flowering plant. Fig. 2.—Flower laid open. Fig. 3.—Entire plant, about 1/12 natural size.

COLEUS AMBOINICUS

(Plate 646)

COLEUS AMBOINICUS

Sugánda

Probably native of British India

Family LAMIACEAE — MINT Family

Coleus amboinicus Lour. Fl. Cochinch. 372. 1790.
Plectranthus amboinensis Spreng. Syst. 2: 690. 1825.
Plectranthus aromaticus Roxb. Fl. Ind. ed. 2, 3: 22. 1832.
Coleus aromaticus Benth. in Wall. Pl. As. Rar. 2: 16. 1831.
Coleus Suganda Blanco, Fl. Filip. 483. 1837.
Marrubium album amboinicus Rumph. Herb. Amb. 5: 294. *pl. 102. f. 2.* 1747.
Iribeli Rheede, Hort. Malabar. 9: 145. *pl. 74.* 1689.

This very aromatic perennial herb with its thick, fleshy, rather brittle leaves has been cultivated in the Old World tropics for many centuries. It is, in all probability, native to some part of British India. Because of its reputed medicinal properties, and further because of its use for flavoring foods and drinks, it was most likely distributed by the early colonizing Indian peoples into various parts of further India and Malaysia. It is apparently the *Iribeli* of Rheede not Drakestein (1689) and is certainly the plant described and illustrated by Rumphius in 1747, which description had been written some sixty years earlier. Writing in the early part of the last century, Roxburgh stated that it was then common in almost every garden in India, but that it rarely produced flowers. It was probably introduced into greenhouse cultivation in England some time during the eighteenth century but was not illustrated in Europe until Lindley's figure appeared in the Botanical Register in 1832.

Just when it was introduced into Mexico is uncertain, but it seems very likely that it was one of the Old World plants introduced via the old Acapulco-Manila galleon route when the Philippines were controlled as a dependency of New Spain. It is now known in Mexico as *orégano,* properly the name of the Eurasian wild marjoram (*Origanum vulgare*); *orégano* is also used in the Philippines for our plant. In recent years it has attracted considerable attention in the United States among that increasing public interested in aromatic herbs, for *sugánda* is *par excellence* an aromatic herb. It may be grown in greenhouses, but because of its succulent nature it seems to be admirably adapted to cultivation as a house plant. It is eminently worthy of trial by all who are interested in succulent and semi-succulent plants as well as those who like to grow aromatic herbs, for combined with its succulent nature is a very pleasing aromatic fragrance.

This species is the type of the genus *Coleus*, Loureiro having selected the generic name in allusion to the sheathing filaments of the normal form. It is rather curious that in this one species flower forms occur that transcend the usually accepted characters that are supposed to separate *Coleus* from *Plectranthus*. In *Coleus* the filaments are normally united into a sheath surrounding the lower part of the style; in *Plectranthus* there is no sheath, the filaments being free. In normal forms of *Coleus amboinicus* the sheathing filaments are a conspicuous feature, but in certain abnormal forms, such as the one here illustrated, there is no vestige of a sheath. In those flowers where the tip of the style is divided into from three to five short arms, there is a corresponding increase in the number of ovary cells, while the filaments are free nearly or quite to the base, as noted by Bentham over a hundred years ago, and quoted by Lindley. Thus within the limits of this one species the generic differences between *Coleus* and *Plectranthus* break down.

Sugánda is an aromatic, perennial, erect, branched herb, growing up to about two feet high from a somewhat woody base, the stems and branches rather stout, cylindric, and more or less pubescent. The leaves are opposite, short-petioled, thick, fleshy, brittle, somewhat crowded, normally ovate, one to three inches long, obtuse or somewhat pointed, usually truncate at the base, more or less pubescent, usually rugose on the lower surface and more conspicuously pubescent beneath than above, the margins distinctly crenate or crenate-dentate. The inflorescences are terminal, erect, somewhat pubescent, up to one foot long, the flowers numerous, somewhat crowded in scattered verticils, short-stalked. The calyx is short, pubescent, scarcely enlarged in fruit, five-toothed, the upper tooth oblong-ovate, acute or acuminate, the lower and lateral ones much shorter, acute or acuminate. The corolla is lavender-pink, deflexed, somewhat pubescent, its tube about twice as long as the calyx, the lower lobe as long as the tube, concave, contracted at the base, the upper lip short, three-lobed, the middle lobe broad, ovate, often retuse, the two lateral ones much shorter and narrower, and obtuse. The stamens are normally four, sometimes five, longer than the corolla, united into a sheath surrounding the style below, or in somewhat abnormal forms, such as the one here figured, free quite or nearly to the base, the filaments glabrous. The style is slightly longer than the stamens, normally with two short subulate lobes, often with from three to five lobes; when with more than two lobes associated also with a corresponding increase in the number of ovary-cells, with the partial or entire elimination of the staminal sheath and sometimes with an increase in the number of corolla lobes. The nutlets are rounded, brownish, and slightly pubescent.

E. D. MERRILL.

EXPLANATION OF PLATE. Fig. 1.—Flower spike. Fig. 2.—Leafy branch. Fig. 3.—Calyx and pistil ×4. Fig. 4.—Corolla laid open ×4.

PLATE 647

ADDISONIA

EUSTYLIS PURPUREA

(Plate 647)

EUSTYLIS PURPUREA

Propeller-flower

Native of Louisiana, Texas, and Mexico

Family IRIDACEAE — IRIS Family

Nemastylis purpurea Herb. Bot. Mag. *sub. pl. 3779.* 1840.
Eustylis purpurea Engelm. & Gray, Bost. Jour. Nat. Hist. **5**: 236. 1847.
Tigridia buccifera S. Wats. Gard. and For. **2**: 412. *f. 125.* 1887.

The flowers of monocots, notably the orchids and irids, frequently present a motley and brilliant array of colors, often with a variegated pattern, as in the plant here illustrated. In the arctic and subarctic regions the primary colors—red, blue, and yellow—are prevalent without pattern variations, but as the tropics are approached several colors are often combined in the same perianth.

That a plant with such a striking and peculiarly constructed flower as *Eustylis* should not have found a stable generic resting place for many years is due to the fact that it was studied mainly from dried specimens. The present plant was launched as a hanger-on of *Nemastylis,* which genus, although a quite definite concept, was frequently stretched in order to accommodate extraneous material. Later, when it was given a good generic haven in *Eustylis,* some botanists still were not satisfied to let well enough alone and interpreted it under still another genus. This very interesting plant having become better known and popular in its native haunts, it is hoped it will stay as represented here, in spite of the propensity of so many botanists and horticulturists not to consider facts, but instead to let their opinions be influenced by tradition. The perianth is a peculiar one, making the flower absolutely unique among our native plants. The popular name, propeller-flower, is an apt description of the perianth because of the way in which the petals are pinched.

The plant grows naturally in the sandy pine woods of Louisiana and Texas. After flowering in June its life history from seed to fruit is rather brief. Falling in the loose sand, the seeds wash deeper and deeper, and gradually develop into bulbs which in turn soon send up flowering stems. In its brevity this schedule is quite different from that of the slow-maturing related plant, *Herbertia Drummondii,* described on a preceding page. The propeller-flower takes well to cultivation where, when transplanted, the stem and leaves die down, but reappear promptly and within three months'

time begin to flower again. While in nature the plants usually produce three or four flowers a season, when placed in rich soil in cultivation plants have produced as many as thirteen flowers over a period of three or four weeks.

The propeller-flower is a caulescent herb with the leaves and scape arising from an ovoid brown-coated bulb about an inch long and a half inch in diameter. The leaves are erect or nearly so, narrowly linear, long-attenuate and plicate. The flower-stem is taller than the basal leaves and is often forked above. The flowers, arising singly or in pairs from the terminal spathe, are long-stalked, ultimately horizontal. The perianth is somewhat ornate, all six divisions concave, and strongly cupped in the lower half, convex above. The sepals are pale brownish-yellow on the concave portion with brown-purple spots and streaks, the convex portion red-purple. The petals are similarly colored on the concave portion, the convex portion pinched so as to form two convex cheeks which barely touch each other, with the apex concave, the whole dark red-purple except the cheeks which are white, each bearing a yellow blotch on the touching sides. The three stamens are appressed to the style, the filaments short-subulate. The anthers are sessile, narrowly pandurate with thick, broad connectives. The style is funnelform, red-purple, with the six tips curved over the tops of the anthers. The capsule is erect or nearly so, about an inch long, opening by three valves, the tips of which ultimately recurve and thus help scatter the seeds.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Tip of flower stem, with tip of lower leaf at side. Fig. 2.—Bulb. Fig. 3.—Essential organs: ovary surrounded by hypanthium, funnelform style and forked stigmas ×3. Fig. 4.—Pandurate anther showing wide connective ×3. Fig. 5.—Maturing capsule subtended by spathe. Fig. 6.—Mature dehiscing and partly dried capsule.

VENIDIUM CALENDULACEUM

(Plate 648)

VENIDIUM CALENDULACEUM

Native of South Africa

Family CARDUACEAE — THISTLE Family

Venidium calendulaceum Less. Syn. Comp. 32. 1832.
Venidium decurrens var. *calendulaceum* Harvey, Fl. Cap. 3: 461. 1865.

The last decade has witnessed the introduction into gardens of a number of hitherto uncultivated species of ornamental South African flowers as well as a revival of interest in others. The latter were mostly brought into cultivation during the first half of the nineteenth century or even earlier, at a time when there was great interest among amateurs in securing as large a representative collection of species as possible. *Venidium calendulaceum* is one of these. If we may judge from the frequent references in horticultural literature, this plant was once much grown, but its favor waned. The popularization of the gorgeously flowered *V. fastuosum* following its reintroduction into our gardens some twelve years ago served to call attention to other members of the same genus; as a result *V. calendulaceum* is now offered by many dealers. Although somewhat less attractive in flower, this plant blooms more freely than *V. fastuosum* and does not have the latter's unfortunate habit of producing a large percentage of deformed flowers.

A successful attempt to combine the good qualities of both species in a hybrid has been made and the resulting plant is known as *V. hybridum fastulaceum* (Gard. Chron., III. 88: 450. 1930).

Although reputed to be a perennial, *V. calendulaceum* is essentially an annual as the gardener interprets this term and so must be raised from seed yearly. For use in the outdoor garden, seed should be sown early in the greenhouse and the young plants set out after danger from frost has passed. A soil of only moderate richness with sharp drainage and a position in full sun suits *Venidium* best, but even under the most favorable conditions the plants are apt to die out during spells of hot humid summer weather and can only be relied upon for an early display. To be seen at its best *V. calendulaceum* should be grown in the cool greenhouse for winter flowering. When so treated, either as a pot plant or set out in benches, it produces a wealth of bloom through the late winter and the flowers have a decided value for cutting purposes.

The genus *Venidium* is closely related to *Arctotis*, differing in that the pappus is absent or rudimentary rather than well developed.

Venidium calendulaceum is an herb with very stout, hollow, freely branched stems, reaching a height of from one to two feet when in flower. The branches, which spread widely, so that well grown plants are usually wider than tall, are somewhat angular and covered with clammy hairs, white throughout, except for two or three inches below the flower-head, where the hairs are red. The principal stem leaves are about six inches long; of this length the terminal half is a large broadly ovate or nearly round blade with three main veins; the basal half bears on its sides two to five smaller spreading lobes and the axis between the lobes is winged; both surfaces of the leaves are covered with conspicuous, clammy white hairs. In the upper leaves the basal lobes are progressively larger until in the uppermost there is a single sessile blade one to three inches long, oblong or lanceolate in shape and more or less clasping the stem at its base. The flower-heads are solitary and terminate the branches. The involucre is about three fourths of an inch in diameter and composed of numerous bracts, the outer narrow, green, hairy and prominently recurved at the apex; the inner much broader, blunt, erect and with thin translucent margins; the ray florets are pistillate, twenty to twenty-five in number, clear orange-yellow and about one and one-half inches long. The numerous small disk flowers become darker-colored in age.

T. H. EVERETT.

EXPLANATION OF PLATE. Fig. 1.—Flowering head. Fig. 2.—Face view of bud. Fig. 3.—A basal leaf. Fig. 4.—An outer involucral bract × 2½. Fig. 5.—An inner involucral bract × 2½. Fig. 6.—A ray floret natural size. Fig. 7.—A disk floret × 3.

COREOPSIS SAXICOLA

(Plate 649)

COREOPSIS SAXICOLA

Stone-Mountain Tickseed

Native of Stone Mountain, Georgia

Family CARDUACEAE — THISTLE Family

Coreopsis saxicola Alexander, Torreya 32: 161. 1932.

Among the many yellow-flowered composites which America has to offer to gardens, a number of the most popular are in the genus *Coreopsis.* This recently named species places in the horticultural field a rival to the commonly grown *C. lanceolata,* from which it differs by being more erect and leafy and having slightly more brilliant flowers. By some it is considered horticulturally superior. It is fully as free-flowering as the older species and continues in bloom until cut down by frost. Fully hardy at New York, it has not been tested further north, but is doubtless also as hardy as *C. lanceolata.*

Specimens of this plant had been in various herbaria for many years, labeled *C. grandiflora,* their completely glabrous character and very different seeds apparently having escaped notice. When, in revisionary study, these differences attracted attention, it was seen that the material from Stone Mountain in Georgia was entirely of this type. The species was shortly afterward described, and the following year introduced to cultivation. Thus another endemic was added to the already outstanding flora of the Stone Mountain region. In its natural habitat, the present plant is confined to the residual granitic soil of the mountain, not even extending into the immediately surrounding area of sandy soil. Specimens of apparently the same species have been collected in the granitic area of eastern Alabama. The species has not been found elsewhere.

Of anomalous relationship, *Coreopsis saxicola* combines the general habit, involucre, and paleae of the section *Eucoreopsis* with the achene character of the section *Eublepharis,* possibly indicating a common ancestry of those two groups. Its endemic occurrence on the ancient geological landmass of Appalachia seems further to substantiate this possibility.

The illustration for plate 649 was painted from plants raised from seed collected on the west and northwest slopes of Stone Mountain in 1933 by the Southern Appalachian Expedition.

The Stone-Mountain tickseed is a glabrous perennial herb arising from a stocky cluster of fibrous roots. The basal rosette of leaves lies

flat on the ground during the winter and dies as the new leaves arise in the spring. The leaves are opposite, up to six inches long, pinnatisect into linear to oblong segments, becoming smaller with a reduced number of segments above. The long-stalked flower heads are about one-half inch across, the outer bracts ovate, the inner ovate-lanceolate. The rays are about an inch long, obovate, deep yellow. The disk-flowers are orange-yellow. The achenes are dark purple in color, with columnar glands on the inner surface, and with fimbriate wings.

E. J. ALEXANDER.

EXPLANATION OF PLATE. Fig. 1.—Flower spray. Fig. 2.—A ray floret ×2. Fig. 3.—A disk floret ×3½. Fig. 4.—The ripe involucre. Fig. 5.—Achene back view ×7. Fig. 6.—Achene front view ×7. Fig. 7.—Achene side view ×7.

ACONITUM NOVEBORACENSE

(Plate 650)

ACONITUM NOVEBORACENSE

Beaverkill Monkshood

Native of the Catskill Mountains

Family RANUNCULACEAE — CROWFOOT Family

Aconitum noveboracense Gray, ex Coville, Bull. Tor. Bot. Club **13**: 190. 1886.

Aconitum noveboracense is the only native aconite in New York State. This rare plant is found growing near the banks of the swift-flowing Beaverkill which rises near the peak of Double Top Mountain, and flows through the semi-mountainous region before it reaches the branches of the Delaware River. On the stream at Lew Beach a few isolated specimens are found, but as one ascends the river frequent patches occur until an altitude of nearly three thousand feet is reached where but few plants are seen. Fortunately this aconite is found on restricted property, so that over a period of several years it has been maintaining its own and in certain areas actually shows an increase.

Stations for this plant have been reported from Ohio and Iowa, as well as two or three other sections in New York. While the plant was collected prior to 1857 it was not named until 1886 by Asa Gray. The natives who know the plant in the Catskills refer to it as the Beaverkill Monkshood in allusion to the hood-shaped flower which gives the name of Monkshood to most species of this genus, and to the river near which it is commonly found. Dr. H. H. Rusby collected the plant from this mountain region in 1891 and it has been obtained there several times since by others.

The plant prefers the cool shade of the forest and grows normally within a few feet of the stream's edge, except where freshets have washed it further from the bank. Transplanted to moist shady locations it will survive in the locality of The New York Botanical Garden, flowering here in early June, fully a month before the first flowers appear in the Catskills.

Each year in early spring when the first leaves appear from the rootstock, an axillary bud develops into a short rhizome from the tip of which new roots arise. The tip of the rhizome in turn develops a bud and during the growing season we find enlargement taking place which gives us in the fall a perfect daughter tuber for next year's growth. After the plant has set seed for that year it dies and the

parent rootstock withers away, leaving the single daughter tuber to continue the clonal propagation of the species. Seldom does one find more than one daughter tuber. While plants may be procured from seed it takes about four years before flowers appear.

While aconites are known for their poisonous constituents no record has been published about the chemical entities in this species. The small size of the tubers would mitigate against any commercial activity. Interest in this plant lies in its beauty and its rarity, besides a technical linkage to the aconites of the Old World.

The Beaverkill monkshood is a perennial plant with a slender, erect, leafy stem from two to four feet in height, growing from a small-sized tuberous rootstock. The lower leaves are petioled, three to four inches broad, nearly orbicular, five to seven cleft, the divisions broadly cuneate and incised. The upper leaves are similar but reduced in size and form. The inflorescence is a few-flowered panicle with irregular, zygomorphic, hypogynous, perfect flowers about one-half inch broad and one inch high. The five sepals are blue and the posterior sepal is an arched gibbous helmet tipped with a prominent descending beak. The petals are two to five, the posterior two being hooded, clawed, modified nectaries which are concealed in the posterior sepal. The other three when present are minute. Three nectaries are shown in the illustration, but such a condition is seldom found. The numerous stamens shed their pollen before the stigma of that flower is receptive, hence the flower is dichogamous. The three pistils develop into many-seeded follicles.

WILLIAM J. BONISTEEL.

EXPLANATION OF PLATE. Fig. 1.—Flowering spray. Fig. 2.—Lower stem leaf. Fig. 3.—Stamens and pistils. Fig. 4.—Nectary, side view. Fig. 5.—Nectary, front view. Fig. 6.—Daughter tuber production from the previous year's tuberous rootstock.

DICENTRA CUCULLARIA

(Plate 651)

DICENTRA CUCULLARIA

Dutchman's Breeches

Native of temperate North America

Family FUMARIACEAE — FUMITORY Family

Fumaria Cucullaria L. Sp. Pl. 699. 1753.
Diclytra Cucullaria DC. Syst. Veg. **2**: 108. 1821.
Dielytra Cucullaria T. & G. Fl. N.A. **1**: 66. 1838.
Dicentra Cucullaria Torr. Fl. N. Y. **1**: 45. 1843. (Nom. conserv.)
Bicuculla Cucullaria Millsp. Bull. West Va. Agr. Exp. Sta. **2**: 327. 1892.
Bicuculla occidentalis Rydb. Bull. Torr. Bot. Club **29**: 160. 1902.

Dutchman's Breeches is one of our commonest early spring flowers and may be found in almost any rich deciduous woodland northward from Georgia to the Canadian coniferous forests and occasionally in the northwest, in Idaho, Oregon and Washington. Adapted to life in this type of forest, the plant puts out flowers and leaves early in the spring. Its seeds are matured and food sufficient to carry it to the next season is stored before the leaves of the trees under which it grows are large enough to cast a dense shade. By early or mid-summer its leaves have vanished and the plants cannot be found unless one digs for them in the deep forest loam.

Morphologically, the base of the plant of Dutchman's Breeches is most interesting. When examined about the middle of September, it is found that the short underground stem bears two to six (perhaps sometimes more) dwarf branches on which are found the smallest of the storage organs characteristic of this species. The terminal bud, with its bud-scales surrounding well developed leaf and—in the larger plants—flower primordia, is present at this time. In the axils of the scales of the terminal bud may be seen well developed branch-bud primordia, each already bearing minute appendages. Immediately below the terminal bud and borne directly on the main stem are two to four enlarged storage organs. In older plants of flowering age, two of these, at their tips, bear scars of petioles; in the younger, only one bears this scar. The remaining sessile storage organs have a brown tip or minute mucronation. Dissection and microscopical study indicate that these larger sessile storage organs, in reality, are modified petiole bases, one or two of which bore the aerial leaves of the previous season. The mucronate tip of the others is the aborted leaf blade. Near the base of each of these organs is a minute structure which—on the basis of its vascular supply—can be interpreted only as an axillary bud which has

become fused with the petiolar tissue. The smaller and more numerous storage organs on the dwarf branches prove to have the same basic structure and vascular supply as the larger ones just below the terminal bud. They, therefore, like the larger ones, must be interpreted as highly modified leaf structures. The buds found in the axils of the scales of the terminal bud develop into the dwarf branches of the main stem the following season, and their minute appendages, already visible in September, become the highly modified storage leaves found on them. Ordinarily the food stored in these is digested and used in the vernal development of the plant. Any disturbance, however, which severs them (they are easily broken off) and removes them from the physiological dominance of the parent plant, permits the bud which each carries to develop into a new plant. It is apparently thus that many of the large colonies of the Dutchman's Breeches are maintained.

Dicentra Cucullaria is a low, perennial, vernal herb up to ten inches in height with a short, branched, underground stem. Its leaves are of two types. The aerial form is ternately compound, its divisions stalked and finely dissected into linear or oblanceolate segments which are dark green above and pale beneath; the petiole base of each is an enlarged storage organ from which the upper part of the leaf is deciduous. The sub-aerial leaves, occurring both on the main stem and its side branches, are small, greatly modified, bulb-like storage organs, each with a mucronate tip which represents the aborted leaf blade. The flowers, four to ten in number, are borne on a simple, falsely secund raceme. The pedicels of the individual flowers bear two small bracts. The sepals are small and subcordate. There are four petals, the outer two being cream-white, or sometimes pink, and generally distally yellow with spreading tips and spurred bases, the spurs about as long as the body of the petals; the inner petals are reduced and clawed, distally crested and partially fused. There are four stamens. The ovary has one loculus and when mature bears fifteen to twenty black shining seeds on its two placentae.

W. H. CAMP

EXPLANATION OF PLATE. **Fig. 1.**—A single aerial leaf and typical racemes from three plants. Natural size. **Fig. 2.**—Basal portion of a large flowering plant as seen in May showing the petioles of the two aerial leaves with their enlarged storage bases and the lower portion of the single raceme; the expanded scales of the terminal bud in whose axils occur the dwarf branches of the main stem already bearing well developed sub-aerial storage leaves; and below, the same highly modified, but exhausted, basal leaves of the previous season which disintegrate during the summer. Natural size. **Fig. 3.**—Bracts and sepals × 2. **Fig. 4.**—Stamens × 2. **Fig. 5.**—Inner pair of petals and ovary × 2. **Fig. 6.**—Pistil at anthesis × 2. **Fig. 7.**—Mature fruit. Natural size.

CENTAUREA MACROCEPHALA

(Plate 652)

CENTAUREA MACROCEPHALA

Golden-thistle

Native of Armenia

Family CARDUACEAE — THISTLE Family

Centaurea macrocephala Purschk. ex Willd. Sp. Pl. 3: 2298. 1804.

The Mediterranean region is the home *par excellence* of the genus *Centaurea.* From that area have come nearly all of the species of horticultural value. The majority of these are rather weedy in their manner of spreading too easily by seed, but some few well-behaved ones are justly popular, such as *C. montana* and *C. suaveolens* and a few of their relatives.

Our present subject belongs to a different group, the members of which form large plants with coarse foliage, but which by reason of their late-summer flowering period and numerous large heads make an especially fine showing as background border plants. Plants of *Centaurea macrocephala* have been seen covering three or four square feet with as many as twenty-five large, golden, thistle-like heads in flower at once. The beauty and giant of the genus however, is *C. babylonica,* scarcely known in North American gardens, with huge dock-like leaves, silvery green in color and a tall stalk topped by a racemose panicle of golden heads which bring the plant to a height of eight to twelve feet.

Native of Armenia, *Centaurea macrocephala* was introduced into European gardens several years prior to 1809 when it was first illustrated in the Botanical Magazine. It has not been well known in American gardens in the past and is even now little grown, but is certainly worthy of more attention, for it grows easily in almost any soil and demands little attention. It belongs to the group of centaureas wherein the ray and disk florets are all alike and the involucral bracts have lacerate margins. Most of the other members of this group are little cultivated, and it is to be hoped that more of them will eventually come into favor by reason of their hardiness and showy quality.

The golden-thistle is a perennial herb with thick, fibrous roots and a heavy caudex from which arise several to many little-branched stems. The basal leaves are rough-pubescent, yellowish-green, up to a foot long, somewhat twisted and with entire or undulate margins. The stems, three to four feet tall and gradually swollen upward, are

somewhat scabrous, thinly long-pubescent, and lightly arachnoid. The cauline leaves are sessile, auriculate at the base, scabrous and slightly arachnoid, oblong-elliptic, acute, somewhat twisted, yellow-green, reduced upward into the outer bracts of the involucre, and there densely arachnoid. The involucre is about an inch and a half in diameter, the outermost bracts with lanceolate-acuminate, entire, brown tips, the inner ones with ovate to oblong green base, and an upper expanded, scarious, brown portion, which is orbicular, laciniate, and with the midrib produced into a spine-like tip. The florets are all alike, bright golden-yellow, an inch and a half long. The achene is tan-colored, striate, obovoid, and capped by the numerous, persistent, tan pappus-bristles.

E. J. ALEXANDER.

EXPLANATION OF PLATE. Fig. 1.—A flowering head with the upper portion of the stem. Fig. 2.—An involucral bract. Fig. 3.—A floret. Fig. 4.—A floret laid open ×2.

AMSONIA RIGIDA

(Plate 653)

AMSONIA RIGIDA

Star Dogbane

Native of northern Florida and southern Georgia

Family APOCYNACEAE — DOGBANE Family

Amsonia rigida Shuttlew. Small, Fl. SE. U. S. 935. 1903.

Nearly a century ago Ferdinand Rugel came to this country from Germany and for several years collected plants in the Southern States, from the coasts to the highest mountains, before settling permanently at Knoxville, Tennessee, and vicinity. In Florida he confined his operations to the coastal regions and consequently fared better than E. T. Leitner, who ventured into the interior and never came out. In April, 1843, he visited St. Marks, Florida, most likely reaching that then thriving Gulf Coast port by boat, for the country inland thereabouts was held by hostile Indians. Rugel, in his travels naturally found many plants, both genera and species, new to science.

The first collection of the plant here illustrated was made in April, 1843, in swamps near St. Marks. Not long after this, when Alvan Chapman took up his residence at the neighboring port, Apalachicola, the plant was found again. Many years elapsed before it was again collected. Notwithstanding the botanical activity in Georgia over a long period, this dogbane was not discovered in that state until the beginning of the present century.

The star dogbane craves water, but it is not aquatic. Its habitats are various: in the flat country they are either swampy or moist pine-woods or higher pinelands where the water-table remains near the surface, while in hilly country they are usually on bluffs where there is seepage from the higher elevations. The plants grow in a sandy soil with plenty of humus intermixed. They are hardy in the open in The New York Botanical Garden. The illustration was made from plants collected by the writer near Indian Pass, Florida, and grown in the Garden for over a decade.

The star dogbane is perennial from a woody root. The stem is glabrous, herbaceous, up to five feet tall though usually smaller, with rather regular ascending branches, especially on the upper part. The leaves are numerous, alternate, nearly of the same size throughout the plant. The blades are elliptic or sometimes elliptic-ovate or ovate, mostly one to two inches long, acute or acuminate, entire,

short-petioled, glabrous, dark-green above, more or less glaucous beneath. The flowers are few or numerous in cymes terminating the main stem and the branches short-pediceled. The calyx is glabrous and broadly campanulate. The lobes are deltoid to lanceolate-deltoid, acute or slightly acuminate, often pale-margined. The corolla is salverform and glabrous without. The tube is violet at the base, green or blue-green at the throat, the former longer than the latter. The tube and throat are pubescent inside with a special ring of hairs at the mouth. The limb is three quarters of an inch wide, light-violet with a white "eye." The lobes are spreading, slightly broadened upward, as long as the tube and throat or nearly so. The stamens are included. The anthers are ovoid, longer than the free parts of the filaments. The ovary is slightly depressed. The style is short-filiform. The stigmatic cap is slightly depressed. The follicles are slender, three to five inches long, attenuate, glabrous. The seeds are cylindric, brown, wrinkled and pitted.

JOHN K. SMALL.

EXPLANATION OF PLATE. **Fig. 1.** Top of stem in flower. **Fig. 2.**—Calyx with pistil exserted, × 5. **Fig. 3.**—Corolla laid open to show stamens, × 2. **Fig. 4.**—Fruit. **Fig. 5.**—Seed, × 10.

OCHNA SERRULATA

(Plate 654)

OCHNA SERRULATA

Native of Natal

Family OCHNACEAE — OCHNA Family

Diporidium serrulatum Hochst. Flora **27**: 304. 1844.
Ochna serrulata Walp. Rep. **5**: 400. 1846.
Ochna atropurpurea Hook. Bot. Mag. Pl. 4519 in part. 1850. Not *O. atropurpurea* D.C. 1811.
Ochna multiflora Williams; W. Robinson, Garden **22**: 574. 1882. Not *O. multiflora* D.C. 1811.

Although rarely seen in cultivation, *Ochna serrulata* is a strikingly handsome plant for growing under tropical greenhouse conditions. In Southern California and possibly in Southern Florida it may be grown in the open. Its decorative value lies not only in the abundance of clear yellow flowers which grace its branches during the spring, but also in the beauty of its highly colored fruits which remain attractive over a long period.

In gardens confusion has long existed with reference to the correct name of this plant and it has usually been grown as *O. multiflora.* Under this name good illustrations appear in Garden **22**: 574 and Gardeners' Chronicle III. **40**: 212. Reference to the original plate of *O. multiflora,* however, proves that species to be very different from our present plant. So far as we have found the only illustration which has appeared under the name *O. serrulata* is in the Botanical Magazine, *plate 9042. O. serrulata* is closely allied to *O. atropurpurea,* with which it has to some extent been confused, but it is more limited in range.

Under greenhouse cultivation this plant must be afforded a humid atmosphere and temperatures appropriate for the growth of tropical species if satisfactory results are to be obtained. Good light is also essential. Because in general habit and appearance *Ochna serrulata* suggests to the gardener a hardwooded cool greenhouse shrub, it may easily be grown too cool. Both here and in England I have observed growers attempting its cultivation in a cool greenhouse, but never with success. An ordinary potting soil, well enriched and permitting the easy passage of water, is a favorable rooting medium. Propagation is best effected by means of seeds, which germinate very readily. Often healthy young seedlings may be found growing on the bench where fruiting plants have stood. Cuttings of half-ripened wood may be taken during the summer, but these do not root very easily.

Ochna serrulata is a woody, glabrous shrub of loose and open growth, up to five feet or possibly more high. The trunk-branches and older twigs are clothed with a gray-brown bark which is roughened by the presence of numerous light brown lenticels. The characeous, very shortly petiolate leaves are arranged in a somewhat distichous manner. They are glossy green above, rather paler below, narrowly elliptic, up to two and a half inches long by three-quarters of an inch broad. The leaf margins are sharply serrulate with slender teeth. The nerves and particularly the mid-vein are prominent and raised above the surface. The flowers are solitary in the axils of the leaves or terminal on short spurs. They are borne on drooping slender pedicels and possess five bright yellow, obovate petals with cuneate claws. The sepals are spreading, broadly elliptic and yellow-green at the time of flowering, but later become oblong, increase greatly in size, are strongly reflexed and assume a brilliant red color. The numerous stamens are borne on the lower part of the receptacle in alternating position in two rows. The deciduous anthers are bright orange and open by terminal pores. The filaments are persistent on the enlarged receptacle as a bristly fringe. The five carpels are free from each other and from the long style and are arranged around its base on the receptacle. The ellipsoid drupelets are shining, at first bright green and later rich black-purple in color. They form a striking contrast to the vermilion red of the enlarged receptacle on which they are borne and to the persistent sepals.

T. H. EVERETT.

EXPLANATION OF PLATE. **Fig. 1.—A flowering branch. Fig. 2.—Calyx, androecium and gynoecium natural size. Fig. 3.—A stamen ×5. Fig. 4.—The gynoecium ×3. Fig. 5.—Mature green fruit. Fig. 6.—Ripened fruit.**

2

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4

3

M Sorensen.

SENECIO RUGELIA

(Plate 655)

SENECIO RUGELIA

Winter-well

Native of the Great Smoky Mountains, North Carolina and Tennessee

Family CARDUACEAE — THISTLE Family

Rugelia nudicaulis Shuttlew. ex. Chapm. Fl. S. U.S. 246. 1860.
Senecio Rugelia A. Gray, Proc. Am. Acad. **19**: 54. 1883.

Isolated on the summit ridges of the Great Smokies, and without near relatives among the Senecios of the United States, grows this anomalous plant called Winter-well because it is said that wherever it grows on the mountains the cattle can be wintered safely. In appearance and habitat it is so unlike *Senecio* that the question at once arises—should it really be included in that genus? Comparison with other members of the genus reveals the fact that in the structure of the flower-heads and florets our plant is most nearly similar to some of the tropical groups which are sometimes separated as distinct genera. There is also a striking similarity to certain members of the aggregate which once comprised the genus *Cacalia,* especially some of those of the Mexican highlands segregated as two distinct genera. It may well be that *Senecio Rugelia* is in reality a relic of an ancestral genus which had its home on the ancient landmass of Appalachia, and from which the plants destined to become the Cacalian aggregates migrated southward or southwestward, leaving behind a form that still shows enough anomalous relationships to indicate its possible ancestral character. Its habitat in a region adjacent to the fountain-source of the eastern American flora appears to lend a point in favor of that possibility. The probable solution of the problem might be to restore Shuttleworth's monotypic genus as the most logical manner of treatment.

Senecio Rugelia grows in the partial shade of coniferous evergreens near the edges of the forest and usually in deep moss, an unusual habit for a Senecio. It occurs mostly above five thousand feet elevation and in its few known stations is confined to or within a few miles of the stateline area of the Great Smoky Mountains.

The specimen from which the accompanying illustration was made was collected on Mt. Leconte, Sevier Co., Tenn., by W. H. Camp (♯1882) in July, 1936.

The name *Rugelia* was made in honor of Ferdinand Rugel, the original collector of the plant.

Senecio Rugelia is a perennial, stoloniferous herb, arising from a thick, creeping rootstock. The leaves are mostly basal, their blades ovate, thick, undulate-serrate, three to six inches long, tapering more or less abruptly to a winged petiole two to six inches long. They are dark green above, paler below, both surfaces floccose-arachnoid when young, glabrous or with scattered fragments of the webbing at maturity. The scape, which is up to twenty inches tall, is glandular-puberulent and bears several bracts similar to but smaller than the leaves, and passing into the elliptical glandular-pubescent bracts of the inflorescence. The inflorescence is a racemoid cyme, densely glandular-pubescent, the heads nodding, on peduncles two to four inches long, or sometimes solitary at the top of the bracted scape. The involucres are a half inch to an inch and a half long with two or three lanceolate bracteoles, the bracts linear, dark green, often with a reddish tinge. The heads are discoid, the florets exceeding the involucre, dirty white in the shade, greenish when growing in the sun. The androecium is dark brown, much exserted. The achene is ten-ribbed, columnar, light brown, the numerous pappus-bristles barbellate, tan-colored.

E. J. ALEXANDER.

EXPLANATION OF PLATE. Fig. 1.—Inflorescence. Fig. 2.—A leaf. Fig. 3.—A ray floret × 2. Fig. 4.—An achene × 2.

SENECIO MILLEFOLIUM

(Plate 656)

SENECIO MILLEFOLIUM

Yarrow-leaved Ragwort

Native of the southern Blue Ridge

Family CARDUACEAE — THISTLE Family

Senecio Millefolium Torr. & Gray Fl. N. Am. **2**: 444. 1843.
Senecio Memmingeri Britton, Bull. Torr. Bot. Club **25**: 147. 1898.

In company with the preceding plate, we illustrate for the first time in color two of the rarest and most highly endemic of native ragworts, each confined to a small area of the southern Appalachian Mountain system.

To one familiar only with eastern species, this plant without its inflorescence is remarkable for the genus, but in the Southwest and in Mexico are a number of species with the same general type of foliage, though none are so deeply or doubly cut. In relationship, it is most closely allied to a group of the southwestern United States and Mexico, to which also belongs another southern species, *Senecio glabellus*. This relationship is but another of a series of tie-ups between the southeastern and the Mexican highland floras.

The known range of this ragwort is covered by six counties in southwestern North Carolina and two adjoining counties of South Carolina. Even in this small area, the plant is only of local occurrence, in all cases in thin soil on rocks or cliffs.

So few are the localities in which the plant has been collected as to make their listing of interest in giving the range of the species. NORTH CAROLINA: Flat Rock, Henderson County; Whiteoak and Skyuka Mountains, Polk County; Macon and Jackson Counties without definite locality; Wild Cat Ridge, Macon County; Black Mountain, Buncombe County. SOUTH CAROLINA: Caesar's Head, Greenville County; Table Rock, Pickens County.

The plant described as *Senecio Memmingeri* is merely an aberrant form of this species as to its type material from Flat Rock, North Carolina; the specimens from the remaining portions of the range, originally considered *S. Memmingeri* at The New York Botanical Garden, are *Senecio Smallii*.

The plant from which the accompanying plate was painted was obtained by the writer on the face of the cliffs at Caesar's Head, South Carolina, in 1933, and grown since at The New York Botanical Garden, where its basal leaves have proved to be evergreen. Its

free-flowering character and brilliant color coupled with the finely cut leaves render it an attractive border plant, if obtainable.

The yarrow-leaved ragwort is a perennial herb arising from a stoloniferous rootstock to a height of two and a half feet in rich soil, but only to fifteen to eighteen inches in dry stony soil. The basal leaves are 6–15 inches long, the cauline ones becoming successively shorter and passing into the bracts of the inflorescence. All are thrice-pinnate with linear to filiform segments, the petioles woolly-flocculent below. The inflorescence is a compound cyme. The heads are seven-sixteenths of an inch high, the involucral bracts linear, glabrous, with one or two outer bracteoles usually present. Both ray and disk flowers are bright clear yellow.

E. J. ALEXANDER.

EXPLANATION OF PLATE. Fig. 1.—Inflorescence. Fig. 2.—A leaf. Fig. 3.—A ray floret × 2. Fig. 4.—A disk floret at anthesis × 3. Fig. 5.—A disk floret after anthesis × 3.

LILIUM HANSONII

(Plate 657)

LILIUM HANSONII

Hanson's Lily

Native of northeastern Asia

Family LILIACEAE — LILY Family

Lilium Hansonii Leichtl. ex Baker, Jour. Linn. Soc. 14: 245. 1875.

One of the easiest of lilies to grow, becoming permanently established under favorable conditions, Hanson's lily is much to be desired in any garden. While it does well enough as a border plant, the flowers have a tendency to bleach in strong sunlight, hence more satisfactory results are obtained by planting it in partial shade, where the full beauty of the brilliant orange-yellow flowers is developed. Since it is one of the stem-rooting types, it is necessary to plant the bulbs six or more inches deep in order that the stems may gain full strength for supporting the heavy cluster of small flowers.

The earliest of garden lilies to appear above ground in the spring, it is sometimes injured by late frosts, and, as a result, fails to flower that year and the year following.

Hanson's lily has a most interesting history. Two or three bulbs arrived in Leyden in 1868 or 1869 and were purchased the following year by Max Leichtlin, who upon realizing that they represented an unnamed species, proceeded to dedicate it to Mr. Hanson, a lily enthusiast of New York. Before a proper description was published, it was figured in English periodicals under two erroneous names. A native habitat, however, remained unknown until 1916, when a Japanese forestry officer collected it on volcanic Dagelet (Matsushima) Island, off the east coast of Korea. In 1917, E. H. Wilson and Dr. T. Nakai visited this island, and found the lily to be quite common from one hundred to three thousand feet above sea-level, in thickets and open forests where humus lay deep and rich. Wilson states that it was unquestionably found by Maximowicz about 1860 on the shores of Victoria Bay near Vladivostok, as was stated by Elwes, but that he failed to distinguish it from *L. medeoloides*. Wilson, although he published a careful description in his "Lilies of Eastern China," did not state whether his description was drawn from the wild or the cultivated plant, what variation, if any, was seen, or whether the wild form differed or not from the cultivated one.

As to the cultivated plant, it appears that the entire stock is possibly a single clone which is self-incompatible and does not produce seed to self- or intra-clonal pollination. In 1925 capsules containing fertile seeds were obtained at the New York Botanical Garden by Dr. A. B. Stout, by using pollen of wild plants from Manchuria, which, while somewhat similar, had redder and smaller flowers and were either a distinct clone or possibly *L. medeoloides*.

Hanson's lily arises from a subglobose or ovoid sometimes oblique bulb one and a half to two and a half inches long, white, but rosy-tinged at the acute summit, becoming rosy all over after exposure. The scales are closely imbricated, infolded and appressed, rather coarse, nearly triangular to ovate, acute, not articulate. The bulbs are multiplied by division, and may be termed cespitose. The leaves are dark, lustrous green and are borne in three to five whorls along the hollow stem. They are oblong-oblanceolate to oblanceolate, acuminate, narrowed to the base, varying in length according to position on the stem, and in width according to the number in the whorl. Above the uppermost whorl several smaller leaves are borne alternately scattered along the stem. The inflorescence is three- to twelve-flowered, in a rather compact raceme. The perianth is an inch to an inch and a half long and two inches across when expanded. The perianth-segments are thick and fleshy, strongly recurved, keeled on the outer side, bright orange-yellow with many purple-brown spots which are numerous on the lower portion. The stamens are shorter than the perianth, the anthers olive-brown or purplish. The pistil is slightly longer than the stamens, the stigma capitate. The capsule is subglobose, an inch to an inch and a half long and of the same breadth, the lobes sharply ridged, the summit somewhat depressed.

EDWARD J. ALEXANDER.

EXPLANATION OF PLATE. Fig. 1.—The inflorescence and leaves above the whorls. Fig. 2.—A whorl of leaves. Fig. 3.—A capsule.

KLEINIA CHORDIFOLIA

(Plate 658)

KLEINIA CHORDIFOLIA

Native of South Africa

Family CARDUACEAE — THISTLE Family

Senecio chordifolius Hook. f. Bot. Mag. *pl. 6216.* 1876.
Kleinia chordifolia A. Berger. Monatsschrift für Kakteenkunde **15:** 20. 1905.

Thomas Cooper discovered this graceful Kleinia at Burghersdorp, Albert Province, South Africa, in 1861. It was first flowered in cultivation at Kew in 1874, and since then has won well-deserved recognition, now being found in many collections of succulents.

In its native habitat the slender stems, long tapering cylindric leaves and lax few-flowered inflorescences give the plant an elegance which can be used to great advantage both in outdoor subtropical gardens and in the greenhouses of cooler regions. For effect in the latter, it achieves its maximum success grown as a weeping plant in a suspended basket.

The culture required to develop this plant into its characteristic habit demands, above all, full light and air. Soil of well drained and gritty nature with the minimum of humus is best, and a mixture of one-third loam, one-third sharp sand, and one-third crushed brick proves very suitable. Given the minimum of moisture, this kleinia exists but fails to develop properly. Given too much, or inadequate drainage, soft impermanent growth results. Propagation is a little less readily accomplished by stem or leaf cuttings in this species than in many of the other kleinias, but seed is quite reliable.

The genus *Kleinia* was named in honor of Jakob Theodor Klein, famous German zoologist, to embrace a number of members of the large group *Senecio* which are fleshy.

Kleinia chordifolia is a slender, glabrous, succulent subshrub, varying in height from one to three feet. With age the stems become woody toward their base, and leaves do not persist upon these parts. The upper portions which bear the leaves retain a powdery glaucous appearance similar to the leaves and reminiscent of *K. ficoides,* though less blue. The leaf scars are pronounced, and dead leaves are always to be seen still adhering between the woody and fleshy parts of the stem. The branches are few, and the alternate leaves, concentrated toward the apex of these, are seven to ten inches long by a quarter inch in diameter, linear, almost cylindric in shape, strongly dilated at the base, sessile, glabrous, slightly glaucous, erect at first, becoming slightly drooping later. The inflorescence is a slender axillary cyme, with long peduncle, erect

branches, and few-bracteate pedicels. The involucre is cylindrical, green; the connate bracts are linear with an acute apex. Beneath the involucre is an involucel of scale-like bractlets which gives the inner series the appearance of a calyx. The flowers are white, the corolla lobes short, ovate-lanceolate. The style-arms are truncate, and have short, rounded appendages. The pappus is very soft, white, and slender. The fruit is a slender pubescent achene.

FRANK G. MACKANESS.

EXPLANATION OF PLATE. Fig. 1.—The inflorescence. Fig. 2.—Top of stem, to show leaves and base of the inflorescence. Fig. 3.—A floret at anthesis ×3. Fig. 4.—A floret after anthesis ×3.

ERYTHRONIUM MULTISCAPOIDEUM

(Plate 659)

ERYTHRONIUM MULTISCAPOIDEUM

Sierra Fawn-lily

Native of California

Family LILIACEAE — LILY Family

Fritillaria multiscapoidea Kellogg, Proc. Calif. Acad. **1:** 46. 1855.
Erythronium grandiflorum Benth. Pl. Hartw. 339. 1857. Not Pursh.
Erythronium grandiflorum var. *multiscapoidea* A. Wood. Proc. Acad. Phila. 1868: 166. 1868.
Erythronium Hartwegii S. Wats. Proc. Am. Acad. **14:** 261. 1879.
Erythronium multiscapoideum (Kellogg) Nels. & Kennedy, Muhlenbergia **3:** 137. 1908.

While most of the dog-tooth violets in America range in color from cream to yellow and fading pink, the generic name *Erythronium* comes from the Greek word meaning red in allusion to the type species. The ancestral home of the genus, which comprises twenty-four species, has been accredited to the Northwest Pacific region, where fifteen species and many varieties are recorded, spreading in range to the foothills of the Sierra Nevadas of California and eastward to the Rocky Mountains. Only four species are recorded east of the Rockies.

Erythronium bulbs were eaten to some extent by the Indians of Nebraska, North Dakota, Montana, and California and also crushed and made into poultices to cure boils. Indian children of the prairie states ate the raw bulbs with avidity when dug in the spring, while a few of the prairie tribes used the leaves as greens.

The Sierra fawn-lily is limited in range to six counties in central California where it was first discovered in 1847 by Theodore Hartweg in Tehama County. Bentham, not recognizing the new species, identified the Hartweg specimen as *Erythronium grandiflorum* Pursh, a northern species which differs in its earlier bloom, unmottled leaves, recurved perianth and wider range, which extends throughout the Northwest. The plant was again collected in Eldorado County in 1855 by Kellogg, who called it "Blushing Bells" and named it *Fritillaria multiscapoidea* with the reservation that it would "ultimately require a new genus."

Plants were apparently sent to England at an early date, for prior to 1881, it is recorded in cultivation at Kew, where it was blooming in March with the flowers remaining in good condition for two to three weeks.

The material illustrated here was obtained from plants grown under cultivation at The New York Botanical Garden.

The Sierra fawn-lily is a low herb arising from a deep-seated, membranous-coated, ovoid-oblong bulb, with slender stolons arising as offshoots from its base. The habit of producing runners or offshoots differentiates this from all other western species. The leaves are oblanceolate with an acute apex, the larger leaves sometimes obtuse, usually two, with a third and rarely a fourth leaf formed, each leaf narrowed into a short winged petiole. The young shoot is a dull reddish brown, the color persisting on the under side of the expanded leaves; the upper surface is richly mottled or marbled in a light tone of green and a dull purplish red. The flowers are either solitary or two or three arising from a sessile umbel, the flowers being borne on naked elongated reddish brown pedicels of unequal length. Occasionally a pedicel branches and bears a second flower on a short subpedicel some distance above the leaves as in other species. The flower buds have the same reddish brown color as the pedicels, this color becoming more diffuse with the expanding flowers, while the under side of the inner whorl of segments is less tinted, being merely streaked a dull red along the veins. The perianth segments are spreading, not recurved as are those of related species, lanceolate to oblanceolate, one and one-quarter to two inches long and one-fourth to three-eighths of an inch wide, with the apex commonly blunt and more or less hooded. The segments of the inner whorl sometimes have a small rounded appendage at the base. These appendages, when present, develop into four small, somewhat inflated sacs, the lateral ones often reduced to a ridge-like fold, or all four are reduced and represent a continuous ridge with the auricles appearing only as a slight widening of the base. The upper part of the segments is a creamy white shading through light yellow into an orange toward the base, the center of the basal part sometimes being darker in shade. The filaments are about one-quarter of an inch long and very stout, and they lack the characteristic dilation at the base which is common in many of the other species. The anthers are white to creamy yellow, usually three-eighths of an inch long. The style is slender, slightly club-shaped, and about five-eighths of an inch long. The stigma is deeply three-lobed, the lobes entire and strongly recurved. The ovary is oblong-ovoid, about one-eighth of an inch long. The capsule is slightly winged, oblong-obovoid, one-half to five-eighths of an inch long.

G. L. WITTROCK.

EXPLANATION OF PLATE. Fig. 1.—A flowering plant. Fig. 2.—The bulb. Fig. 3.—The basal portion of segment of the inner whorl showing appendages × 2. Fig. 4.—The basal portion of segment of the outer whorl × 2. Fig. 5.—A stamen. Fig. 6.—A pistil showing the three-lobed stigma. Fig. 7.—A mature capsule.

KUNZEA AMBIGUA

(Plate 660)

KUNZEA AMBIGUA

Native of southeastern Australia

Family MYRTACEAE — MYRTLE Family

Metrosideros corifolia Vent. Jard. Malm. *pl. 46.* 1803.
Leptospermum ambiguum Sm. Trans. Linn. Soc. **13:** 264. 1797.
Kunzea corifolia Reichenb. Consp. 175. 1828.
Kunzea ambigua Druce, Rep. Bot. Exch. Cl. Brit. Isles 1916 : 629. 1917.

The island continent of Australia is endowed with an almost bewildering variety of members of the Myrtle family. Many of the genera are endemic, the form of their flowers bizarre, and the form of their leaves unusual for the family, but all are of great beauty and would be valuable additions to greenhouse collections in northeastern North America could they but be induced to healthy flowering state. The difficulties attendant to their good growth under our conditions are in the majority of cases such that we must be content with only those few that have proved amenable. Many which have so far been impossible to handle under greenhouse conditions, may be grown out of doors quite satisfactorily in southern California and Florida.

Although white flowered, our present subject is nevertheless showy, as the drooping branches are profusely covered with bloom, and the slender heath-like leaves merely add to its grace.

The genus *Kunzea,* named in honor of Gustav Kunz of Leipzig, was made to embrace a group of species intermediate in character between *Leptospermum* and *Metrosideros* with the small flowers of the former and the long-exserted stamens of the latter, differing as well by technical characters within the ovary. It has since been shown that *Kunzea* is more nearly related to *Callistemon,* but the same generic characters hold it distinct from that genus also.

Within its natural range in New South Wales, Victoria and Tasmania, the plant inhabits rocky areas near the coast, whence it was introduced to cultivation in 1791.

Kunzea ambigua is an evergreen shrub to ten feet, with slender, pubescent, spreading or semi-pendulous branches, the pubescence more silky toward the ends. The trunk and branches are clothed with a close-fitting brown bark. The leaves are linear, gray-green, up to one-half inch long, strongly dark-punctate, silky-pubescent especially on the margin. The flowers are solitary, sessile, and densely crowded toward the ends of the branches and branchlets. The calyx is one-eighth of an inch long, campanulate, green, silky-

pubescent (mostly below the middle), the five lobes small, triangular, and finely ciliate. The petals are orbicular or nearly so, about one-twelfth inch long, and white. The stamens are numerous and indefinite in number, one-fourth inch long (much longer than the corolla), attached in two series to the top of the hypanthium; the filaments are white, the anthers cream-color. The ovary is inferior, seated in the base of the hypanthium. The style is long and slender, the stigma capitate. The fruit is a tough, fleshy capsule completely filling the persistent hypanthium. The seeds are wedge-shaped, very small and brown.

EDWARD J. ALEXANDER.

EXPLANATION OF PLATE. Fig. 1.—Portion of a flowering branch. Fig. 2.—A single flower × 2. Fig. 3.—A petal × 2.5. Fig. 4.—The calyx and gynoecium × 2.5.

LOTUS BERTHELOTTI

(Plate 661)

LOTUS BERTHELOTII

Pelican's Beak

Native of the Canary Islands

Family FABACEAE — PEA Family

Lotus Berthelotii Masf. Anal. Soc. Esp. Hist. Nat. **10:** 160. 1881.
Lotus peliorhynchus Hook. f. Bot. Mag. *pl. 6733.* 1884.

Several Canary Island endemics possess distinct horticultural merit. Although none is winter-hardy at New York, certain of these are deserving of a place in the greenhouse. Not the least worthy is *Lotus Berthelotii* which makes an elegant basket plant and is useful when grown in pots for furnishing the front of a conservatory bench. In Southern California this species has been found a satisfactory subject for planting in sunny rock gardens. It might well be used for similar purposes in other mild climates. G. T. Wall in the Gardeners' Chronicle (III. **88**: 230) says that at Cape Verde it is extensively used for decorating veranda boxes much as other bedding plants are planted in window boxes. He also makes mention of a variety *atrococcinea* which is more tender than the type.

A native of Teneriffe, *Lotus Berthelotii* is described as inhabiting the most precipitous rocks of the great ravine of Tamadava. In cultivation it thrives best when exposed to full sunshine and at all times particular care must be exercised in applying water, for it resents excessive moisture at the root. A light porous soil mixture is favorable to satisfactory growth. Increase is easily secured by means of cuttings taken after flowering and inserted in a sand propagating bench. The plants do not attain their most useful size for greenhouse embellishment until they are two years old.

In Teneriffe the local name of this plant is *Pico de Paloma* (dove's beak) while California dealers offer it under the name of pigeon's beak, both names having reference to the shape of the keel. Hooker's specific name *peliorhynchus* (pelican's beak) seems a more appropriate description of this floral organ but the rule of priority calls for the adoption of the older name.

Lotus Berthelotii is a diffuse, much-branched shrub, silvery in appearance because of the presence of an appressed short silky pubescence on both stems and leaves. The stems are slender and pendent with widely divaricate branches furnished with spreading sessile leaves. Each leaf is divided to the base to form five filiform leaflets which are slightly curved and above five-eighths of an inch

long. The short-pediceled scarlet flowers, to one and a half inches long, are axillary and solitary or borne two or three together toward the ends of the branches. The silky green calyx is about half as long as the corolla, and is divided into five ovate-lanceolate, acuminate, falcate sepals which are much longer than the tube. The two upper are distinctly larger than the other three. The corolla has a sharply recurved, lanceolate standard with a conspicuous dark band along its center, the scarlet margin fading to tawny orange with age. The wings are short clawed, the body ovate, attenuate, its form distorted laterally. The keel is larger than the other petals, with a slender claw and a laterally compressed, long-acuminate body. The stamens are diadelphous, the nine united ones in an alternating long and short series, the filaments twisted and clavate at the tips. The pistil is falcate, its style longer than the ovary, the stigma unequally two-cleft.

T. H. EVERETT.

EXPLANATION OF PLATE. Fig. 1.—A flowering branch. Fig. 2.—The standard. Fig. 3.—A wing petal. Fig. 4.—A keel petal. Fig. 5.—The androecium. Fig. 6.—Two stamen-tips to show form and position × 10. Fig. 7.—The gynoecium. Fig. 8.—Tip of the style showing the stigma × 3.

M. Sörensen.

ERIOGONUM ALLENI

(Plate 662)

ERIOGONUM ALLENI

Yellow Buckwheat

Native of the Central Alleghenies

Family POLYGONACEAE — KNOTWEED Family

Eriogonum Alleni S. Wats. Proc. Amer. Acad. **25:** 134. 1890.

This Eriogonum, the most northeasterly representative of a large western American genus, is, although coarse-growing, a very attractive plant, quite showy when in bloom. Its long flowering-season extends through the latter part of the summer when few plants other than composites are to be seen. The bright yellow flowers, borne in large compound leafy-bracted cymes, and the prominent leaves, dark green above and tan beneath, give it distinctive character for a dry stony slope in a large rock garden.

In its native habitat, it grows on the steepest slopes in clumps frequently two feet high and three feet in diameter, and so plentifully does it flower and so numerous are the plants that a dull golden glow is given to these slopes which are otherwise so barren-looking in late summer. This habitat is one of the most unique floral areas in eastern North America. It stretches in broken form from south-central Pennsylvania across western Maryland and down along and near the Virginia-West Virginia state line, and for it the name of *shale-barren* has been coined. The underlying rock, shale of Devonian age, weathers on the rather steep slopes into loose flaky fragments of too porous a nature to permit the accumulation of much food-matter or soil, and the loose flakes are so inclined to creep that they form an unstable foothold for plants. On the less steep slopes there is a spare scrub growth mostly of pine, oak and mountain-laurel with such interspersed herbaceous plants as are capable of survival in soil of this nature, while on the steeper slopes and bluffs only deep-rooted or fast-growing plants can obtain a root-hold.

The flora is mainly endemic, either as to species, variety or form, with one endemic and monotypic genus, *Pseudotaenidia.* Among the more outstanding of the endemics are *Senecio antennariifolius, Phlox Brittonii, Oenothera argillicola, Trifolium virginicum, Convolvulus stans, Clematis viticaulis, Allium oxyphilum,* a variety of *Holcophacos distortus* and our present subject. Some of the more conspicuous non-endemic associates are *Penstemon canescens, Hypericum prolificum, Sedum Nevii, Clematis ovata, Coreopsis major,*

Allium cernuum, Houstonia longifolia, Polygonum tenue, Viola pedata, Campanula divaricata and pink-flowered forms of *Trichostema lineare, T. dichotomum,* and *Isanthus brachiatus.*

The species is named in honor of Dr. T. F. Allen, who made the original collection of the plant in 1874, about a mile from White Sulphur Springs, West Virginia.

The yellow buckwheat is a deep-rooted perennial growing in large clump formation. The leaves are basal, up to ten inches long, the petiole and blade about equal in length; the petiole is tomentose, much dilated into a clasping base, the blade oblong-ovate, entire, obtusely tipped, cordate, truncate, or cuneate at the base, at maturity dark green and nearly glabrous above, felty-tomentose beneath with tan wool; the young leaves are covered with felt all over, but the tomentum of the upper surface becomes flocculent and is slowly deciduous. The compoundly cymose inflorescence arises to a height of one or two feet on a long, naked, felty-tomentose peduncle, with bracts similar in character and form to the leaves but smaller and short-petioled, verticillate at the swollen nodes, becoming gradually reduced in size, and finally passing into the involucral bracts. The involucres are tomentose, sessile or peduncled, each subtended by three linear or elliptical bractlets. The flowers are very numerous and are continuously produced throughout late summer. The pedicels are tomentose down to the point of articulation, and glabrous below. The three outer divisons of the perianth are glabrous and round-ovate, with the apex broadly rounded; the three inner divisions are obovate, hirsute on the lower portion. There are six to nine stamens; the style branches are filiform, three in number, exserted from the perianth. The fruit is an ovoid, three-angled achene, included in, but free from the accrescent and chartaceous perianth. The seed is dispersed by disarticulation of the pedicel.

EDWARD J. ALEXANDER.

EXPLANATION OF PLATE. Fig. 1.—A branch of the inflorescence. Fig. 2.—Two leaves, showing upper and lower surface. Fig. 3.—An involucre in bud, and its subtending bracts ×7. Fig. 4.—A flower ×7. Fig. 5.—Flower with the perianth removed, and stamens laid out to show the gynoecium ×8.5. Fig. 6.—A ripened flower ×3. Fig. 7.—An achene ×3.

CONVOLVULUS CNEORUM

(Plate 663)

CONVOLVULUS CNEORUM

Silver-bush

Native of Southern Europe

Family CONVOLVULACEAE — MORNING GLORY Family

Convolvulus Cneorum L. Sp. Pl. 157. 1753.

At The New York Botanical Garden this shrubby species of Convolvulus is cultivated as a pot plant for the embellishment of the flower display houses during the spring and early summer months. When grown in a cool greenhouse and exposed to full sunlight it forms an attractive plant for this purpose and is admired as much for its neat habit and silvery foliage as for its pleasing flowers, which are in evidence over a long period. Although not reliably hardy at New York, in a sheltered position it will withstand all but the most severe winters, and is therefore worthy of a trial in the rock garden, where it should be given well drained soil.

Californian dealers offer this plant for sale under the common name of silver-bush and recommend it highly for planting out-of-doors under rather dry and sunny conditions. They report that it is particularly adapted for planting along the sea coast, and that it is seen to good advantage when used for mass effects.

Convolvulus Cneorum is a native of southern Europe and is said to have been cultivated in England as long ago as 1640. Fully developed specimens attain a height of three to four feet and rather more in diameter. Propagation is effected by means of cuttings taken in spring and inserted in sharp sand. They form roots rather slowly, but once established soon make sizeable specimens. In the early stages of growth pinching out the growing tips encourages a desirable habit. Soil mixtures favored by this plant are of light open nature such as will permit thorough aeration and the easy passage of moisture.

Convolvulus Cneorum is a much branched and rather dense shrub to three feet or slightly more in height. The entire plant is covered with a closely appressed silky pubescence which gives to the leaves and younger portions of the stems a very definite silvery appearance. The leaves are ascending, scattered, spatulate-oblanceolate, to two and one-half inches long by five-sixteenths inch broad, shortly mucronate, tapering at the base into a petiole which accounts for one-quarter to one-third of the total length of the leaf. The capitately clustered inflorescences are terminal on the branches.

The bracts range in shape from subulate to spatulate and are of greatly varying sizes up to one inch in length. They are ciliate with long soft spreading hairs. The flowers are subsessile with five ovate to elliptic concave calyx-lobes, each about one-quarter inch long and covered externally with long, soft, spreading hairs, and internally marked with small black dots on the upper two-thirds. The salver-shaped corolla is erect, to one and one-eighth inches long and one and one-half inches in diameter and is irregularly erose and slightly recurved at the margins. It is white with a yellow throat and on the outside has five flattened, triangular ridges which are dull pink in color, the color being still further dulled by the presence of long, coarse, appressed black hairs. The stamens are five in number, two being conspicuously longer than the other three. The filaments are slender and in their lower portions are adnate to the corolla tube. The cream-colored anthers are sagittate and extrorsely dehiscent. The ovary is seated in a fleshy orange-yellow disc which is covered with long coarse white hairs. The style is slender, white, and is branched above into two widely divaricate cream-colored stigmas.

T. H. EVERETT.

EXPLANATION OF PLATE. Fig. 1. A flowering branch. Fig. 2.—Tip of a flowering branch in bud. Fig. 3.—An outer sepal (inner face) ×2. Fig. 4.—An inner sepal (inner face) ×2. Fig. 5.—Two stamens, showing lengths of both series ×2. Fig. 6.—The gynoecium.

KLEINIA FULGENS

(Plate 664)

KLEINIA FULGENS

Brilliant-flowered Kleinia

Native of South Africa

Family CARDUACEAE — THISTLE Family

Senecio fulgens Nichols Gard. Dic. 3: 420. 1886.
Kleinia fulgens Hook. f. Bot. Mag. *pl. 5590.* 1866.

Well named "brilliant-flowered," this plant attracted more attention soon after its introduction to the Royal Botanic Gardens at Kew in 1866 than it has of late. Its waning popularity is unjustified, for, provided with airy conditions, plenty of light, and an open soil, *Kleinia fulgens* can as readily be grown for group floral display as for specimen culture. No lack of symmetry diverts attention from the vivid flowers to the plant, nor does any undesirable character reduce its value as an easily cultivated and desirable succulent.

A usual soil mixture for succulents—one-third each of loam, sharp sand, and crushed brick—with ample drainage provided, is a satisfactory medium. Propagation is readily effected by stem cuttings or seed. In the case of stem cuttings, it is particularly important that time be allowed for all cut surfaces to heal before the cuttings are inserted in the sand. Subsequent injury to a stem should always be sterilized to counteract its apparent predisposition to rot when injured.

Quite suitable for permanent planting in subtropical gardens, for summer bedding in cooler regions, and greenhouse culture elsewhere, this plant may be expected to give its chief display of bloom in May and June.

Kleinia fulgens, one of the brightest of the fleshy senecios named after the famous German zoologist, is a succulent subshrub growing from two to three feet in height, with the leaves generally crowded toward the base. All parts of the plant are covered with a glaucous bloom, and all are relatively brittle. The leaves are succulent, glabrous, from three to six inches long, and vary greatly on the same plant both in shape and size. The blades are ovate, bluntly acute at the apex, the margins entire or irregularly serrate; the petioles short, decurrent. The flowering stems vary in length from six to eighteen inches. They have succulent bracts scattered along them at intervals of from one-half to two inches. These bracts are simple, erect, linear, one-half to an inch long. The heads of flowers are solitary and are either erect or, more generally, turned toward

the sun. The bracts of the involucres are about three-fourths of an inch long, connate, and appear to form a tube with lanceolate lobes. The series of small bractlets so often found below the involucre in members of this genus is absent. The florets are vivid orange-vermilion. The corolla tube is narrow, three-fourths of an inch long, cylindric, curved, slightly ampliate toward the apex. There are five ovate-lanceolate lobes. The two style branches are much recurved, the stigmatic portion papillate, with conical appendages. The pappus is irregular, scabrid, and about half an inch in length. The fruit is a slender glabrous achene.

FRANK G. MACKANESS.

EXPLANATION OF PLATE. Fig. 1.—The inflorescence. Fig. 2.—Base of the stem. Fig. 3.—A floret × 1.5.

ARGEMONE PLATYCERAS ROSEA

(Plate 665)

ARGEMONE PLATYCERAS ROSEA

Native of southern Texas and Mexico

Family PAPAVERACEAE — Poppy Family

Argemone platyceras rosea **Coulter, Contr. U. S. Nat. Herb. 1: 30. 1890. Not *A. rosea* Hook.**

What arresting contrast! The formidable bristles and stiff blue-green leaves which offset the fragile, rosy-purple, silken flower-petals make this plant, *Argemone platyceras rosea,* a veritable knight in armor to place among the prim specimens which usually characterize an annual border. Representatives of this species of *Argemone* have perhaps known real adventure, for specimens are found as far south as Chile, where they are not thought to be indigenous.

The color, which is of a rather dull purplish tone, may introduce some difficulty but, in association with yellows of a lesser intensity, very satisfying combinations may be realized.

A position affording full sunshine and good drainage is of primary importance. In such a situation culture is of the simplest. The way of all poppies is to develop a taproot directly, which makes them difficult to transplant at any stage. For this reason Argemones are best sown where they are to remain, seed being put in the ground the first of May in the vicinity of New York. By spacing the seed drills one foot apart, then inter-sowing two weeks later, the blooming period may be appreciably lengthened. As seedlings develop they should be thinned to stand one foot apart. After this their needs are few as insect pests are unusual.

Mexicans attribute medicinal value to the Argemone, and their belief in its efficacy has been passed on to the Spanish residents of Mexico and South America.

Argemone platyceras rosea is an annual herb. The erect stem grows up to three feet in height, branches freely and is liberally covered with short spines. The leaves are alternate, three to eight inches long, glaucous, and light blue-green with pale veins. The lower ones taper to a winged petiole; the upper ones are sessile or auriculate-clasping. The leaf-blades are sinuate-pinnatifid, with relatively long sharp spines at the margin and frequently on the veins of the lower leaf-surface. The flowers are short-lived and are borne either terminally or in the upper leaf axils. The two or three sepals are sparsely covered with sharp spines. The four or six rosy-purple truncate petals are one to one and a half inches long. The stamens are numerous, in whorls, the filaments dark red in color and

persistent, the anthers yellow. The stigmas are six or less in number, radiate, sessile or nearly so. The seed pod is ellipsoid, single-celled, sparsely covered with short bristles and opening at the top for dissemination of the small, dark brown, pitted seeds.

HOWARD W. SWIFT.

EXPLANATION OF PLATE. Fig. 1.—Flowering portion. Fig. 2.—A lower cauline leaf. Fig. 3.—A stamen × 2. Fig. 4.—The pistil × 2. Fig. 5.—A mature capsule. Fig. 6.—An opened capsule to show dehiscence.

JACOBINIA SPICIGERA

(Plate 666)

JACOBINIA SPICIGERA

Mohintli

Native of Mexico and Central Amercia

Family ACANTHACEAE — ACANTHUS Family

Justicia spicigera Schlecht. Linnaea **7**: 395. 1832.
Drejera Willdenowiana Nees in DC. Prodr. **11**: 334. 1847.
Sericographis Mohintli Nees in DC. Prodr. **11**: 361. 1847.
Jacobinia Mohintli Hemsl. Biol. Centr. Amer. Bot. **2**: 521. 1882.
Jacobinia spicigera L. H. Bailey, Stand. Cycl. Hort. 1715. 1915.

While not to be classed among the showy members of the genus *Jacobinia,* this plant is nevertheless a rather pleasing subject. Its slender bright orange flowers are borne over a period of several weeks and though few, are advantageously displayed. Native from San Luis Potosí southward throughout Central America, it is a well known plant under many native names derived from the Nahuatl word for blue, *mohuitli.* There are many Spanish names as well, all referring to its dyeing properties. A solution from the leaves in hot water is blackish at first but becomes blue, and is used in the same manner as indigo in laundering. Formerly it was also used as a dye, and is still used as a remedy for dysentery, fever and other ailments.

It appears that two or more plants are confused under this name, the one we here picture answering to the original description for *J. spicigera* and *J. Mohintli.* The nearly glabrous plant with corolla rounded in bud, and spreading instead of coiled lower lip is apparently distinct, but awaits further study.

In our specimens all of the corollas are orange, though the original descriptions mention red, purplish, and scarlet, a variation not rare in this family but needing confirmation in the present case.

The mohintli is a much branched shrub up to five feet tall, glabrate below but with the leafy portions of the branches finely pubescent. The leaves are opposite, two to five inches long, broadly elliptic, broadly cuneate at the base, the apex acutish. The petiole is closely pubescent, the blade glabrate above, pubescent beneath, especially on the veins. The inflorescence is axillary, simple or trifurcately branched, the flowers somewhat secund on the branches. The flowers are nearly sessile, subtended by a minute bractlet. The calyx lobes are subulate, one-tenth of an inch long, the free portions more or less setose with spreading hairs. The corolla is tubular-funnelform, glabrous, bright orange, pointed in bud; when expanded, the upper lip is recurved at the tip, the lower lip strongly coiled and deflexed. The two stamens are arched under the upper lip, the anther sacs nearly opposite, dark brown. The ovary is slenderly conical, the style filiform, tipped by the two-parted stigma. The fruit is a narrow, elastically dehiscent capsule.

EDWARD J. ALEXANDER.

EXPLANATION OF PLATE. Fig. 1.—A flowering stem. Fig. 2.—The base of a flower, showing bracts and calyx. Fig. 3.—Tip of lower lip. Fig. 4.—A stamen × 10. Fig. 5.—A pistil × 10.

HELENIUM NUDIFLORUM

(Plate 667)

HELENIUM NUDIFLORUM

Native of southeastern and east central U. S.

Family CARDUACEAE — THISTLE Family

Helenium nudiflorum Nutt. Trans. Am. Phil. Soc. II. 7: 384. 1841.
Leptopoda brachypoda T. & G. Fl. N. A. 2: 388. 1842.

Driving through the Cumberland Mountain section in late summer, one is much impressed with the sight of field after field covered with a golden carpet. Close inspection will reveal the color to be caused by *Helenium nudiflorum* in the low-growing form it takes when in dry soil. The pleasing sight of the color display may be deceiving to the traveler, for to the farmer in whose fields the plant has become established, the plant is a definite weed and its extermination a difficult necessity, because his cattle sometimes develop a taste for it, often with fatal results.

With a blooming period extending from early August into October, this plant, weed though it be, is showy enough to be successfully used in the perennial border or large rock garden where it will grow in any sunny position and provide some gaiety to the otherwise nearly colorless appearance of the area at that time of year. It is best to have only one plant and propagate it by root division to avoid seeding and thus prevent its becoming a pest. Planted in a dry situation it will grow into a compact form, but becomes rank in growth if in rich or damp soil.

The plant ranges naturally from North Carolina to Florida and westward to Illinois and Texas, and is naturalized to the north and east of this area. It is frequent in moist places along streams as well as in dry fields and neglected farmlands.

Helenium nudiflorum is a glabrate to puberulent perennial herb with one to several much-branched stems. Its height varies from about ten inches in dry, poor soil up to three or more feet in moist or rich soil. The lower-growing form is usually more floriferous, the flowers more deeply colored, and the plant more likely to develop into a well rounded form. The leaves are entire and often undulate, oblong-linear, tapering to a blunt tip, and sessile, the margins decurrent as broad wings on the strongly ribbed stem down to the next preceding leaf. They are two to six inches long, dark green in color and glabrous or sparsely coarse-pubescent. The inflorescence is a leafy, paniculate cyme, the branches becoming more pubescent and ribbed toward the tips, and there inflated just below the terminal heads. The involucral bracts are linear, short-strigose, about one-fourth inch long, deflexed at anthesis and remaining so. The yellow

to orange ray-florets are sterile, obcuneate, deeply cleft at the apex and somewhat reflexed. The disk is globular, its florets greenish with dark purple corolla lobes which are strongly papillose on the inner face. The pappus consists of several ovate-lanceolate scarious scales. The fruit is a hirsute achene crowned by the persistent pappus scales.

HILDEGARD SCHNEIDER.

EXPLANATION OF PLATE. Fig. 1.—Flowering portion. Fig. 2.—A ray floret × 2. Fig. 3.—A disk floret at anthesis × 5. Fig. 4.—A disk floret after anthesis with protruding style-branches × 5.

AMIANTHIUM MUSCAETOXICUM

(Plate 668)

AMIANTHIUM MUSCAETOXICUM

Fly-poison

Native of eastern United States

Family MELANTHIACEAE BUNCH-FLOWER Family

Melanthium muscaetoxicum Walt. Fl. Car. 125. 1788.
Melanthium laetum Soland. in Ait. Hort. Kew **1**: 488. 1789.
Amianthium muscaetoxicum A. Gray, Ann. Lyc. N. Y. **4**: 122. 1837.
Chrosperma muscaetoxicum Kuntze, Rev. Gen. Pl. 708. 1891.

In the southern Appalachians, June brings a wealth of flowers to the fore. On the high peaks and ridges, rhododendrons and azaleas light up the forests—they are the spectacular denizens. But among the more humble plants there is great scrambling and rivalry for a place in the limelight, and the result is an array of floral beauty too extensive to list in our brief space. At the edges of swamps and in low or damp rocky woodlands, the feathery candles of the fly-poison stand in stiff array.

The plant is a desirable subject for wild gardens or for damp soil, as it is easily established and hardy. Its plumy flower-spikes are quite attractive and serve to brighten shaded areas where little is in flower.

It is native in low woodlands from Long Island to Florida and west to Arkansas, but more plentiful than elsewhere in the mountain and piedmont areas, ascending to five thousand feet in North Carolina.

As with all of the Melanthiaceae, the flowers are long-lasting, the perianth not falling or even shriveling, but only turning green and remaining at the base of the capsule.

The common name is based on the poisonous quality of the plant, due to the presence of an alkaloid about which little information is available.

The fly-poison is a completely glabrous, perennial herb arising from a fibrous-coated, narrowly ovoid bulb, the old leaf-bases long-persistent as additional fibrous coats. The leaves are narrowly strap-shaped, bright green, paler beneath, ten to twenty inches long, obtuse, the veins rather prominent. The inflorescence is a scapoid simple raceme, the scape one to three feet tall, with one or two leaf-like bracts on the lower part, the upper part with several widely spaced scale-like bracts. The flowering portion is from two to five inches long, each pedicel subtended by a prominent ovate bract one-tenth to one-eighth inch long, the pedicels spreading, one-half to three-quarters of an inch long. The perianth is about one-fourth inch

across, the divisions oblong, greenish white, obtuse, turning green and persisting at the base of the capsule. The six stamens, also persistent, are subulate, about one-eighth inch long, the anthers nearly globular, pale yellow, widely dehiscent their entire length. The pistil consists of three half-ovoid carpels united below the middle, with slender styles. The fruit is an ovoid, trilobed capsule, the free portion of each carpel dehiscent and tipped by the persistent style. The seeds, one to four in each carpel, are covered with a fleshy red aril which dries black.

EDWARD J. ALEXANDER.

EXPLANATION OF PLATE. Fig. 1.—An inflorescence. Fig. 2.—Upper portion of a leaf. Fig. 3.—A flower × 5. Fig. 4.—A stamen × 8. Fig. 5.—A capsule × 2.

PLATE 669

ADDISONIA

LINANTHUS GRANDIFLORUS

(Plate 669)

LINANTHUS GRANDIFLORUS

Native of California

Family POLEMONIACEAE — PHLOX Family

Leptosiphon grandiflorus Benth. Bot. Reg. sub. *pl. 1622.* 1833.
Leptosiphon densiflorus Benth. Bot. Reg. sub. *pl. 1622.* 1833.
Gilia grandiflora Steud. Nom. ed. 2. **1**: 683. 1840.
Gilia densiflora Benth. in DC. Prod. **9**: 316. 1845.
Linanthus grandiflorus Greene, Pittonia **2**: 260. 1892.
Linanthus densiflorus Milliken, Univ. Cal. Pub. Bot. **2**: 56. 1904.

This showy annual is a member of the Phlox family, which, except for one species of the genus *Phlox* is confined to the two American continents and is most abundant in western North America. The genus *Linanthus* is closely allied to *Gilia,* differing chiefly in the opposite cauline leaves, so deeply parted as to appear whorled.

L. grandiflorus is one of the showiest of the genus and is rather uncommon in the wild, being confined to but a few counties in California. There it is said to grow in poor sandy soil on open wooded slopes and valley flats. Its rather limited distribution and relative scarcity may be due to several causes, among which are the mucilaginous nature of the seed when the least bit damp and the plant's general reluctance to produce seed in quantity.

The first account of this species under cultivation was in England during 1833 and 1834 at the Royal Horticultural Society's Garden. Professor Findley writes in the Botanical Register of October, 1834, that the plant is perfectly hardy but cannot bear the summer heat, and flourishes only during the spring and autumn, when the nights are cool!

Although, to the best of my knowledge, we have never tried this plant outdoors at the New York Botanical Garden, I feel sure that our summers would be too warm and the occasional periods of rainy dull weather would surely spell disaster. It has, however, definite merit as a greenhouse subject for spring flowering in the conservatory. By sowing seed in the early part of September sizable free-flowering plants may be had by the latter part of March. As with many of the other California annuals, a well drained sandy soil quite rich in humus is to be preferred for good pot culture.

In general appearance the whole plant is rather grayish and its finely parted palmate leaves give it an air of delicacy and aid in setting off the numerous flax-like flowers ranging in color from white to shades of pink and lavender. The seedlings are best pricked off into small pots at a very early stage and handled with considerable

care. Frequent shiftings are necessary but at no time should the pot be more than an inch larger than the preceding one. Drainage must always be given careful attention. The quantity of manure added to the compost can be gradually increased as the plants are shifted.

For best results a house with a minimum night temperature of 45° and with a maximum exposure to sunlight is most satisfactory. Needless to say, careful watering is a prime requisite as it is far better to keep the plants well on the dry side, particularly during the dull months of December and January.

Linanthus grandiflorus is an annual herb up to three feet tall, but usually only half that height. The stem is glabrous, erect, simple below but frequently branched in the inflorescence, the branches usually alternate. The leaves are opposite, palmately parted to the base, thus appearing verticillate, the divisions linear-filiform, an inch to an inch and a half long, bright green, the lower ones glabrous or puberulent, those in the inflorescence densely soft-ciliate. The flowers are an inch across and are borne, one to many, in a dense head in the terminal and subterminal axils at the ends of the branches. The calyx is about one-half inch long, densely soft-ciliate, the lobes shorter than the tube, which is scarious except for the midribs. The corolla is funnelform to nearly salverform, the tube yellow, one-half to three-quarters of an inch long, the lobes obovate, three-quarters of an inch long, white, pink, lavender, or lilac, often darker veined and with a dark purple eye-spot at the throat which sometimes extends as a stripe into the throat. The stamens are inserted on the corolla at the base of the throat, the slender filaments being about one-eighth inch long, equaling the throat. The pistil is included in the corolla tube; the ovary is three-celled, the style slender, the three stigmas filamentary. The fruit is a three-celled capsule, loculicidally dehiscent. The seeds are pale buff, becoming mucilaginous when wet.

JOSEPH W. TANSEY.

EXPLANATION OF PLATE. Fig. 1.—An inflorescence. Fig. 2.—Calyx and pistil × 2. Fig. 3.—Vertical section of corolla. Fig. 4.—A capsule. Fig. 5.—A seed × 5.

NERINE CURVIFOLIA

(Plate 670)

NERINE CURVIFOLIA

Native of South Africa

Family AMARYLLIDACEAE — AMARYLLIS Family

Amaryllis curvifolia Jacq., Hort. Schoenb. **1**: 33. *pl. 64.* 1791.
Amaryllis Fothergillia Andr., Bot. Rep. *pl. 163.* 1801.
Nerine curvifolia Herb., Bot. Mag. sub. *pl. 2124.* 1820.

Probably at no time since the days of that great geneticist, the Hon. and Rev. William Herbert (1778–1847), has such a profound and widespread interest been taken in the Amaryllis family as is abroad today. Not only do we find the *Amaryllidaceae* popular with the average gardener whose interest in plants may be general but in many cases the connoisseur and collector has made it his prime study.

Although a few exceptions in the family are indigenous to temperate regions—notably *Narcissus*—the rest are mostly confined to tropical and sub-tropical regions.

It was Dean Herbert who separated *Nerine* from the genus *Amaryllis,* stating in the Botanical Magazine in 1820 that the two are widely separated. He indicates that *Nerine* is rather allied to the Pancratiums of the Western Hemisphere (*Hymenocallis* Salisb.).

Nerine, represented in Cape Colony by fifteen species, is an interesting and horticulturally useful genus. *N. curvifolia* with its variety *Fothergillii,* which is more robust than the type, and *N. sarniensis* share greatest popularity in greenhouses. There are many excellent hybrids of both. If certain definite cultural requirements are adhered to, few potted plants demand less attention from the grower. They may be grown in any cool greenhouse with facilities to exclude frost, provided always that they are granted a thoroughly light, cool and airy position. They rarely flower freely when disturbed, but rather enjoy a potbound condition and a rather small receptacle into which the fleshy roots may become established. Even then we cannot be assured of every matured bulb flowering. Perhaps in their case some special cultural need is not fully understood by gardeners. By October 1 the flower scape, starting to push up from the crown of the bulb, shows the first signs of growth. Immediately prior to this they should be repotted when occasion demands. Five bulbs in a six-inch pot make a conveniently sized pot plant. A good rich friable loam is desirable with the bulbs planted near the surface. In this they should remain for a number of years

with an annual replacement of surface soil and removal of offsets which may be potted separately. Such offsets provide a ready means of propagation. As the flowers mature, leaf growth commences. A liberal supply of water must then be given to established plants. They revel in overhead watering and weekly feeding with liquid manure or a complete greenhouse plant fertilizer. Continue this treatment until late spring when the leaves show signs of ripening, indicating the approach of dormancy. From that time, water must be withheld gradually and from May the plants should rest through the summer in a dry and sunny position.

Nerine curvifolia is an herb with scape and leaves arising from an ovoid bulb enwrapped with a very fine but dense light-brown casing of somewhat brittle texture. When matured the bulb is two inches in diameter. The peduncle, slender, round, and erect, is twelve to eighteen inches long with a convex umbel of usually eight scarlet flowers, each on a pedicel an inch to an inch and a half long, subtended at the base by a linear, red, scarious bract of the same length. The entire umbel is subtended by two ovate, red, scarious, spathevalves an inch and a half long, recurved at flowering time. The perianth segments are about an inch and a half long, tapering and recurved at the apex. The six stamens are about the same length as the perianth, with red filaments and brown anthers. The ovary is bluntly three-angled, inferior, the style red, slightly shorter than the stamens, the stigma capitate. Six leaves, ten to twelve inches long and three quarters of an inch broad, develop after the scape. They are strongly glaucous, obtuse, arcuate and tapering, slightly thicker in texture than in the Guernsey Lily, *N. sarniensis*.

J. G. ESSON.

EXPLANATION OF PLATE. **Fig. 1.—An inflorescence. Fig. 2.—A leaf. Fig. 3.—A bulb with leaves at flowering time. Fig. 4.—The gynoecium.**

PENSTEMON WHIPPLEANUS

(Plate 671)

PENSTEMON WHIPPLEANUS

Native of the Rocky Mountains

Family SCROPHULARIACEAE — FIGWORT Family

Penstemon Whippleanus A. Gray, Proc. Amer. Acad. 6 : 73. 1862.
Penstemon glaucus stenosepalus A. Gray, Proc. Amer. Acad. 6 : 70. 1862.
Penstemon stenosepalus Howell, Fl. Northw. Amer. 1 : 514. 1901.

Among peculiarly American plants, those of the genus *Penstemon* are proving themselves among the most adaptable as garden plants. From them a number of first-rate border perennials as well as rock-garden subjects are becoming popular, and deservedly so, for they are all easily raised from seed, readily divided, and the majority are hardy at least as far north as New York and many still farther. The color range is through various shades of blue, purple, pink, rose, and many intermediates of these colors, also occasionally white, and nearly all are of neat growth and not weedy. There are, of course, as in any large group, a few ugly ducklings, but these few are rare and not very likely to appear in the trade. Our present subject, while not quite an ugly duckling, is not particularly desirable, as it is weak-stemmed and sparse-flowering in spite of a rapidly spreading growth.

The principal reason for drawing attention to this plant is that it seems to be common in European gardens under the name of *P. Hallii,* a dwarf, alpine species far superior in every way. Since the true *P. Hallii* is so exceedingly rare, seed is frequently obtained from Europe, but so far, all obtained has proved to be this inferior plant.

P. Whippleanus, which appears in many manuals under its synonym *P. stenosepalus,* is native in the central and northen Rocky Mountains and quite common in certain meadow areas just below timberline in Colorado and Wyoming. It occurs in three color forms, the one here pictured, a dark, black-purple, and a dirty white. In mass in these subalpine meadows it is quite showy, but since it is not free-flowering in eastern gardens, it is not comparable with the free-flowering species.

Penstemon Whippleanus is a perennial herb with loosely cespitose growth and opposite, semi-evergreen foliage. The plant consists of an intricately branched maze of wiry fibrous-rooted rhizomes on or just beneath the surface of the soil, from which rise sterile leafy stems one or two inches tall as well as the taller flowering stems. The leaves of the sterile stems are oblong-ovate, entire or serrulate, the petioles about one inch long, the blades one to two inches long, obtuse

or acutish, dark green above, paler beneath. The flowering stems are up to two feet tall, terete and glabrous. The lower cauline leaves are sessile and oblong, the upper ones ovate or broadly lanceolate with sessile, cordate base. The inflorescence is a compound, cymose panicle, the branches contracted and opposite, glabrous up to the first pair of bracts; above that, both rachis and pedicels are glandular-pilose. The pedicels vary from one-eighth to one-fifth inch in length. The five calyx-lobes are one-fourth to one-half inch long, lanceolate-acuminate, glandular-pilose. The corolla is three-fourths to one inch long, the apical third short-glandular-pilose in bud, strongly bilabiate, the slender tube expanding abruptly into an open funnel-form throat, the limb short, its lobes acutish. The color varies from a dirty white with purplish veins to a red-purple with darker veins and even to an unveined black-purple. The lower lobe is long-bearded within, the upper sparsely so. The four stamens are dark purple, glabrous, the anthers opening their entire length. The sterile filament is slightly barbed at the apex or glabrous. The style is slender, swollen apically into the stigmatic portion. The fruit is a dry, ovoid two-celled capsule, dehiscing septicidally and loculicidally into four segments. The numerous seeds are brown and wrinkled.

EDWARD J. ALEXANDER.

EXPLANATION OF PLATE. Fig. 1.—An inflorescence. Fig. 2.—A sterile shoot. Fig. 3.—Corolla laid open ×2. Fig. 4.—A stamen ×4. Fig. 5.—Gynoecium ×2. Fig. 6.—A capsule.

KALANCHOË TUBIFLORA

(Plate 672)

KALANCHOË TUBIFLORA

Native of Madagascar

Family CRASSULACEAE — ORPINE Family

Kalanchoë delagoensis Eckl. & Zeyh. Enum. Plant. Afr. Austr. Extratrop. 305. 1836. (nom. nudum) Hamet, Bull. Herb. Boiss. II. 8: 39. 1908.
Bryophyllum tubiflorum Harvey, Fl. Cap. 2: 380. 1861–62.
Kalanchoë verticillata Scott Elliott, Ann. Bot. 5: 354. 1891.
Bryophyllum delagoense Schinz & Junod, Mem. Herb. Boiss. No. 10: 38. 1900.
Kalanchoë tubiflora Hamet, Bot. Centralbl. Beih. 29²: 41. 1912.

In climates where cacti and other succulents thrive, *Kalanchoë tubiflora* does well under outdoor cultivation. For other sections of the country it commends itself as being particularly worthy of the attention of fanciers of house plants. Being of a xerophytic nature it is well adapted to the arid conditions which normally prevail in apartments and dwelling houses and in addition it possesses the interesting habit of producing from the tips of its leaves numerous small plantlets complete with roots which are readily detached or which eventually fall off of their own volition and establish themselves in the surrounding earth, thus affording a rapid and ready means of increase. Mature plants bear handsome drooping flowers in terminal panicles during the winter. The colorful flowers remain attractive over a long period.

Provided a suitable soil and a sunny position are given, *Kalanchoë tubiflora* affords the cultivator no especial difficulties, indeed, it is one of the easiest of plants to grow well. A start may be made either with seed or with plantlets detached from a mother plant. As with all succulents the seed is sown in a very porous, sandy medium and if this is kept just moist the seedlings soon appear.

The young plants are first set in small pots and are successively repotted into larger receptacles as growth necessitates, a four- or five-inch pot being sufficiently large for the final potting of a single specimen. Sometimes three plants are set together and in this case they are finished in a pot of six inches diameter. The solitary specimens exhibit to the fullest advantage the beauty and symmetry of the leaf arrangement.

A porous soil assuring rapid drainage is necessary and we find it of benefit to add to the usual mixture of loam, leaf-mold and sand a very considerable proportion of crocks, broken bricks, or coarse coal cinders. Sharp drainage is further hastened by placing an inch or two of crocks over the hole in the bottom of the pot. Since these provisions are made to carry away superfluous moisture, the gardener

must exercise care that the soil is never allowed to become dry. It must be maintained always in a reasonably moist condition, for excessive dryness results in the falling of leaves.

Kalanchoë tubiflora is a succulent, glabrous, perennial herb to three feet high. The stem is erect, unbranched and, like the leaves, is glaucous with a lavender-gray bloom. Beneath this covering it is of pale green closely spotted with dark markings. Mature leaves are about three inches long and are mostly in whorls of three, but near the base and on the upper portion of the stem they are sometimes alternate. In section they are subcylindric, becoming slenderer toward the base and more distinctly flattened above toward the apex. They are uniformly marked above and at the sides with distinct purplish-green blotches. Near the apex are from five to eight sharp teeth each furnished with a downward-pointed spur-like appendage from which arises a young plantlet. The plantlets each have four small elliptic to obovate leaves, the outer pair being of unequal size and the inner pair smaller and of even size. Roots are produced while the plantlets are still attached to the parent leaf. The leaves of young plants are flattened above and slightly rounded below and vary from obovate to spatulate. The third or fourth pair of leaves exhibits the first evidence of teeth, which in successive pairs become more pronounced as the leaves assume the more typical shape. The inflorescence is a corymbosely compound panicle four to six inches across. The bracts are cuneate to linear, three-toothed or entire, up to three-eighths of an inch long. The pedicels are three-eighths to five-eighths of an inch long and are spreading or recurved. The flowers are more or less nodding. The calyx is short-campanulate, about one-half inch long, deeply parted, the four lobes ovate-lanceolate, acute, and much longer than the tube. The corolla is yellow or orange, and is suffused with red, with a slender tube abruptly expanded into a tubular-inflated throat an inch to an inch and a half long. The four lobes of the limb are spreading, quadrangular-ovate, and abruptly tipped. The disk glands are oblong and one-twelfth of an inch long. The eight stamens are inserted in two rows at the base of the throat; the filaments are slender, just exserted from the throat, and the anthers oblong. The four carpels are nearly free, oblong-ovoid, the styles filiform, equaling the corolla in length, each tipped by a capitate stigma.

T. H. EVERETT.

EXPLANATION OF PLATE. Fig. 1.—An inflorescence × ½. Fig. 2.—A portion of the stem × ½. Fig. 3.—The calyx nat. size, with an individual sepal. Fig. 4.—The corolla laid open, nat. size. Fig. 5.—The gynoecium, nat. size.

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